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Earnings-Related Mandatory Pensions

Concepts for Design

The relative merits and drawbacks of various options for insurance design, privatization, and degree of public funding in the design of mandatory earnings-related pensions.

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Summary findings

Valdés-Prieto offers a framework for economic policy on mandatory earnings-related pensions.

He does not discuss the gains and losses from mandating insurance and savings, nor the use of this policy as a vehicle for income redistribution. Instead, he concentrates on areas that are less well understood: the microeconomics, the macroeconomics, and the political economy of mandatory pensions. His analysis focuses on three main areas: insurance design, privatization, and degree of funding. In each area, he provides a checklist of design issues, drawn from international experience and economic analysis.

For insurance, there are two sets of choices: between flat actuarial factor or individual actuarial factor and between defined benefit or defined contribution (in the sense of financial guarantee).

For privatization, the essential choices are between private or nationalized provision, and between private or national demand.

For funding, the choices are between funding or not funding, and between apparent funding or pay-as-you-go financing.

Some combinations can be discarded. Privatization should not be combined with flat actuarial factors, for example, because private suppliers will compete for access to rents that accrue to workers who are awarded implicit subsidies. Privatization is compatible with apparent funding, but not with pay-as-you-go financing, because in the latter there are no funds to invest in the capital market.

The policy choice is ultimately between two coherent designs whose relative advantages and drawbacks Valdés-Prieto discusses:

- An individual actuarial factor with privatized production and demand, with risk explicitly allocated to pensions, and with partial funding.
- Or a flat actuarial factor coupled with nationalized production, pay-as-you-go financing, and statutory promises of fixed real pensions (defined benefit).

This paper — a product of the Macroeconomic and Growth Division, Policy Research Department — is part of a larger effort in the department to understand the underpinnings of old-age security systems. The study was funded by the Bank's Research Support Budget under the research project "Old Age Income Security Report" (RPO 677-45). A previous version of the paper appeared under the title "State Pensions: Concepts for Reform." Copies of this paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Hoda Rizkalla, room N11-041, extension 84766 (58 pages). April 1994.

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EARNINGS-RELATED MANDATORY PENSIONS : CONCEPTS FOR DESIGN*

by

Salvador Valdés-Prieto**

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1. Introduction

Many countries are reforming their pension systems, but the motivations are very different. In developing countries and transition economies, basic clean-up is in order, as inefficiency and abuse are extensive. In other countries, the pension system is inequitable. In yet other countries the covered groups do not believe that the pension system will deliver the insurance they seek, i.e. they believe their pensions will be taxed away by inflation or other means.

Emergency measures to clean up the problems that currently seem most urgent can easily be in conflict with long-term objectives. This danger is substantial, as long-term objectives in pension policy are usually ill-defined and poorly understood. This paper offers a framework to guide long-term economic policy towards mandatory pensions.

Different objectives in government policies towards pensions are the standard situation. For example, pension systems are expected to provide income redistribution, worker protection from employer abuse, tax incentives for long-term savings and mandatory earnings-related pensions, all at the same time. This paper adopts the fundamental assumption that each of these objectives can be approached independently, originating different types of government interventions. This is more than an assumption. In fact, this is the conclusion of a companion paper (Valdés-Prieto, 1993). Treating these objectives separately allows both the development of a sound basis for policy and separation of design from administrative implementation.

For example, the objective of income redistribution does not have to be attained by tinkering with mandatory earnings-related pensions, or health insurance for that matter. The government has an alternative set of tools - tax and transfer policies - that may be more effective to achieve redistribution towards the poor old or the old in general. Regarding intervention to assure protection of those workers that enter into voluntary contracts for old-age savings or insurance with their employer, such as in large corporations in many OECD countries ("private pensions"), a similar result obtains. These regulations can be part of general regulations for consumer protection, where voluntary pensions are just one instance, and they do not have to be considered necessarily in the mandatory pension system.

This paper does not discuss in detail the two main justifications for government intervention when mandating purchase insurance for old age, invalidity and survivorship. Still, it is useful to mention them here. The first is the prevalence of improvidence among significant parts of the population. The second is the reduction of the fiscal cost of supporting members of pressure groups that force the government to finance their old age by failing to save on their own.

This paper also assumes that the country under study will mandate insurance for old age, invalidity and survivorship. This assumption is by no means innocent, because it is possible that in many countries the best policy is to avoid mandating savings and insurance while creating redistributive programs in favor of the poor old. The fact that New Zealand, Australia and South Korea did not have mandatory earnings-related pensions until very recently suggests this is an institution that can be dispensed with for at least some decades. Still, there is a subset of countries that have mandatory earnings-related pensions and can improve on the particular design they have. This paper is aimed at those countries.

Our main proposition is that mandatory earnings-related pension systems can be classified along three economically independent design dimensions. These are insurance design, privatization versus nationalization, and the funding mode. Sections 2, 3 and 4 suggest that many hybrid forms are feasible and sometimes more desirable.

Section 2 discusses insurance design and financial guarantees. This yields a set of specific policy recommendations at the microeconomic level, that are useful for country advice. We highlight the distinction between the flat (i.e. "social" insurance) and individual actuarial factors, and their implications for income distribution and risk sharing. Protection of pensions from inflation leads to a discussion of methods of indexation. Another important topic are the gains from international diversification of demographic and investment risks. Intergenerational risk sharing is also discussed.

Section 3 discusses nationalization versus privatization of pension services production and demand. This is an emotionally charged issue where dispassionate analysis is scarce. We argue that privatization of production is feasible in the pension services industry. On the demand side, provider selection can be privatized, either through the use of private trustees or through individual choice. We argue that unassisted individual choice of provider is inconsistent with the diagnosis of widespread improvidence. However, we find that mandated use of private trustee foundations chosen by employers and unions is compatible with improvidence so it is the natural way to "privatize" demand.

The gain from privatization is a higher quality of individual insurance for workers and a smaller perceived tax in mandatory contributions. This is achieved by reducing the historically large probability of unilateral renegotiation of pension promises by the political process. This situation is associated in developing countries - and in some quite wealthy as well - to nationalized provision governed by statute. Taxation of pension rights by the political system is harder when independent trustees and private fund managers can represent the interests of workers in opposing it. Protection is

also increased when pension rights are backed in part by investments abroad, particularly in smaller countries.

Another advantage of privatization is that management of the consequences of demographic change becomes automatic, reducing the delay and perverse measures that have been observed when management is in charge of the political system. The costs of privatization are also discussed in section 3, including higher administrative costs and substantial regulatory requirements needed to limit the possibilities of exploitation and fraud by private providers.

Section 4 discusses the third design dimension, the degree of funding. We first offer a fiscal neutrality result: privatization of provision and demand, and a diversification of investments away from government promises, do not require any changes in the primary fiscal accounts nor in tax incidence - considering both intergenerational and current incidence. In this case the pension system does not serve as a new source of savings. This establishes that funding is an economically separate design dimension.

Our macroeconomic review shows that introducing a funded rather than an unfunded system avoids a reduction in national saving rate for a few decades and allows a higher stock of capital in the long run. In the case of countries that already have a mature PAYG-financed pension system, a reduction of the capital stock has already occurred and cannot be reversed unless a saving program is started anew. If expectations take a particular form - expected pensions are zero at first - the capital stock can increase in the "short" run when introducing a PAYG-financed pensions, but in the long run when expectations are met this result is reversed.

In the presence of credit constraints, introducing a mandatory funded system actually increases the capital stock in the long run, while mandating a PAYG-financed system still leads to a reduction in the capital stock in the long run. The possibility of forcing a higher capital stock associated to full funding raises the concern that the marginal productivity of capital may fall below the long-term growth rate, or equivalently, that the capital market is unable to absorb all these savings at an interest rate above the long-term growth rate. However, a movement to partial funding through the issue of public debt and immediate consumption of the proceeds is a policy response that prevents this outcome.

After discussing international experience regarding funding, and the political dynamics associated to it, we argue that the linkages between the degree of funding and "constitutional" design are critical for long term success. The design of political incentives includes both institutional design and the degree of privatization.

The concluding section of this paper discusses the interaction between the three design dimensions: can we combine a social benefit formula with private management ? Maybe the independence of the three design dimensions is limited when adding political economy considerations. In any case, the best overall design is the one that maximizes the size and security of pension benefits for individual workers, for any given contribution rate.

2. Insurance Design.

The first responsibility of a mandatory pension system is to provide the services that are expected from it, namely earnings-related pensions for old-age, invalidity and survivors that replace lost earning power and preserve the standard of living.

The net social value of mandatory earnings-related pensions is less than the value of the insurance it provides. This is because in the absence of compulsion, other institutions like the family, the private capital market and some firms would still offer insurance to their members and workers. Only the extra value afforded by compulsion of misinformed, miscalculating, myopic or lazy workers can be assigned legitimately to this government intervention.

However, this extra value can be negative if the design of the pension system provides low quality insurance from the individual's point of view. Low quality may be result of the overall design of the political incentives, which leads to default on pension promises by the govenment (as in Mexico in the 1980s) or of specific microeconomic design features. This section focuses on the latter, and section 4 takes up the former.

Unfortunately, in a number of countries the technical design of pensions is dismal. For example, Spain paid unindexed pensions until 1985. Consideration of diversification and risk management is typically inadequate. The design of benefit formulae is defficient in all countries. Rational design at the microeconomic level can contribute significantly to the technical efficiency of most pension systems.

2.1 Basic Intra-Generational Insurance

a) The contribution rate. The fundamental role of a pension system is to allow preservation of consumption levels in case of old-age, invalidity and insurance. This requires that the contribution rate be chosen appropriately.

An excessive contribution rate may generate pension benefits that are larger than the disposable salary while working. This entails an excessive reduction in take-home pay when active. An insufficient contribution rate finances

pensions that are much lower than the disposable salary while working. Both are symptoms that the pension system is not meeting its purpose efficiently. An actuarial study can determine the contribution rate that will support a "replacement ratio" , i.e. the ratio of disposable pension to disposable wage, in the range of 50-70%.

Contribution rates can be differentiated by age and sex. The Swiss option of having lower contribution rates for those below age 32 may be attractive in developing countries, where it is important to avoid incentives, due the combination of credit constraints and forced contributions, that push young workers to prefer the informal sector. In Singapore, contribution rates are lower for those above age 55, to induce them to postpone retirement.

b) Indexation of pension benefits (Inflation Guarantee). In many pension systems, property rights to benefits are vulnerable to domestic inflation. This prevents the pension system from meeting its basic purpose, which is to preserve consumption power when the insured contingencies occur (old age, invalidity and death). If expected domestic inflation for the next 40 years cannot be reduced to zero, then some policy measure is needed so that current contributions are not peceived as a pure tax by the young. Note that a simple reduction of inflation to hard currency levels, say 3% per year, is not enough because it implies a 70% depreciation over 40 years.

Indexation of benefits to a Consumer Price Index is the standard answer to escape long-term inflation.

In the case of PAYG-financed pension systems or apparently funded pension system - those funded systems which are heavily invested in government securities not backed by outside assets - indexation of benefits requires indexed government debt. In fact, pension promises in several countries are indexed to the evolution of the CPI or salary indices, so a significant portion of government debt is alreay indexed.

However, explicit indexation of government bonds raises fears about inflexibility of fiscal spending and an increase in the risk of a fiscal crisis. That is why to achieve stable indexation, some complementary measures are necessary. The first one is to improve the ability of the tax system to collect revenue in an inflationary environment. That implies the collection methods must require frequent partial payment, and that the penalties in case of delay must be based on real interest rates, not nominal rates.

In the case of funded pension systems that are heavily invested in private sector securities, inflation is a very serious challenge. Most capital markets in the world do not offer indexed bonds. This explains why employer based pension funds in the OECD rely very heavily in equity investments, which are less exposed to inflation risks. The cost of this is that pension portfolios may be too risky.

That is why funding of pensions requires an effort to extend indexation to debt finance. This is a major drawback of funded pensions, but it not impossible to overcome, as explained in 4.2.

c) Insure the risk of longevity. A number of mandatory pension systems follow the Provident Fund model, where old age benefits are paid in the form of a lump-sum. This feature is usually criticized because it does not provide insurance for longevity risk, which is the risk of outliving one's financial resources. The risk of longevity can be insured with annuities. The level of monthly payment is calculated with a mortality table, so that the resources freed by those who die early, plus interest, finance the pensions of those that die later than average.

The critique of lump-sum benefits is that it assumes that older people are not subject to lack of self-control, misinformation, miscalculation laziness or myopia. The assumption is that old people will spend their lump-sum wisely. This is at odds with the rationale for all mandatory insurance. Summing up a complex literature, the first of these rationales is the prevalence of improvidence among significant parts of the population. The second rationale is to reduce the fiscal cost of helping influential groups that count on government help to supplement their income in old age. There are indications suggesting that improvidence continues to affect a substantial share of the population after age 50 and also after age 65, in several countries. However this hypothesis could be tested through surveys for any given country.

d) Insure for invalidity and death. A number of countries do not mandate invalidity insurance nor survivors' insurance. For countries that already decided to mandate old-age pensions, the additional cost of mandating invalidity and survivor insurance can be modest, since group contracts can be taken for bids.

Most of the additional costs are associated to medical measurement of actual invalidity and to rehabilitation of partial invalids. Independent and accurate review of invalidity claims is essential to prevent abuse by unscrupulous physicians who sell invalidity certificates or medical exams to claimants that are not actually invalid. Independent review is also necessary to avoid discretionary granting of invalidity pensions as payment for political favors.

This insurance must be designed with a view towards adverse selection and moral hazard. In Chile up to 1983, people could obtain invalidity coverage with just 12 months of voluntary contributions, and the pension would be based on the average contribution for those months. This allowed abuse by some people who affiliated to the pension system after becoming invalid, raising the invalidity rate much above the actual invalidity incidence among long-term members. This adverse selection problem raises the cost of invalidity coverage substantially. It also lends itself to moral hazard, as

invalids are prepared to over-report income for those 12 months as that will increase their permanent pension substantially. The solution is to limit this coverage to members that have contributed for a substantial period. This was achieved in Chile by linking the invalidity pension to the average of contributions for the past 10 years unless the worker is very young. As recent workers have many zeros in that average, they obtain very low pensions.

2.2 The design of Benefit Formulae

a) The Covered Wage and Redistribution

Observed redistribution is either planned or unintended. Most pension systems use non-neutral definitions of the covered wage in the benefit formulae, which induce unintended redistributions that frequently overwhelm the explicit redistribution incorporated in the formula. A critical result is that the quality of the insurance provided to the individual is reduced. This section explains how to weed out unintended redistribution.

Any benefit formula determines pensions as follows:

(1) $P = Po + (1-t) \cdot a \cdot W$, where

P = the pension to be paid.

Po = flat rate component. $a \cdot W$ is the earnings-related component.

W = covered wage at retirement.

a= actuarial factor. It can be constant, or be a function of other variables. It can be different for each individual or be uniform for all covered workers. The actuarial factor is given by the budget constraint at the individual or group level. In all cases the actuarial factor is "forward looking", in the sense that it seeks financial equilibrium over some number of years into the future.

t = tax rate on benefits, whose revenue is used to finance the flat rate component Po.

A pension system can be designed to be as redistributive as desired, by raising tax t to finance an increase in Po. An alternative is to raise general taxes and increase fiscal support to the pension system so that Po can be raised. Both options generate planned wealth redistribution.

Most mandatory pension systems use formulas to determine the covered wage W that induce unintended wealth redistributions. An exception are defined contribution systems. These are simple inefficiencies that can be remedied at low cost. Consider the following widely used definitions of W:

i) W is calculated as an average of past nominal wages. This method is used in Spain, where the average of the nominal wages for the last 8 years of work determines W, with the nominal wages of the earliest 6 years adjusted for CPI inflation up to two years before the date of pensioning. This leaves beneficiaries subject to inflation risk. An eventual bout of inflation in the last two years of work can reduce real pensions substantially, so the quality of these pensions from an individual's point of view is quite limited.

ii) W is calculated as the last wage while active, or the average of a small number of the last years while active. The extreme version of this method, basing W on the last wage, is currently used in Germany for civil servant pensions, and in defined-benefit private pensions offered by large employers in the OECD. Brazil bases W on the avenge of CPI-adjusted earnings during the last three years. This formula reduces inflation risk but leaves the worker exposed to the risk of a real wage reduction in those last years. More worrying, this method for calculating W is regressive, since it is an established empirical fact that the poor have a flatter path of lifetime income[1,2]. Given this, higher income workers will get a higher pension in relation to their contributions.

iii) W is calculated as the average of CPI-adjusted wages during the N1 best of the last N2 years (with N1 < N2). France defines W as the average of the best 10 years since 1947. Bulgaria defines W as the average of the three consecutive years with highest earnings, out of the last 15 years of work. This formula redistributes in favor of formal sector workers that choose career paths with highly variable earnings, which in many cases are salespeople that earn more than blue collar workers. This method of calculation also opens the system for abuse because there is no penalty for undercontribution for all years except for the best N1. Using a simple average of just 10 years of covered wages has other drawbacks discussed below.

iv) W is calculated as the simple average of all CPI-adjusted or wage-index-adjusted wages since entering the labor force. For example, the United States currently defines W as the simple average of earnings after 1950, excluding the 5 years with the lowest earnings. The problem with this method is that an average implies equal weighing of different years, and this in turn implies regressive redistribution in comparison to a present value formulation. With this formula the present value (at retirement date) of contributions as a ratio of pension benefits is lower for the rich than for the poor. This is because more of the contributions of the rich are made closer to retirement, due to the higher slope of their earnings path. In addition, lower-income workers usually enter the labor market at a younger age, so they contribute for more

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[1] See Ehrenberg and Smith (1985) for striking evidence of "fanning-out" of earnins-age profiles in the United States.

[2] One explanation is that higher paid jobs allow the worker to learn more and increase his/her qualifications over time.

years. Savings at age 25 receives the same credit than savings at age 35, so the longer saving effort of low-income workers is not recognized by the formula.

v) Men and women. As women exhibit a much higher mobility in and out of the labor force than men, on average they show a much higher number of zeros for the wages received for the last ten years. That is why with these formulae women get a smaller pension even though they may have contributed the same number of years than a man that went to college and retired at 55, but contributed more regularly. In many countries the covered wage formula allows women to retire younger, leading to an additional set of cross-subsidies towards and between women. Unplanned redistribution between women that pursue different careers in the labor market is the norm, not an exception.

A Neutral Formula

This critique shows that the benefit formula used in most countries is technically inefficient, in the sense that it generates unplanned redistributions. To eliminate them, we propose a truly neutral formula for covered wages. In this formula W is reinterpreted as "covered wealth". The neutral covered wealth is a straightforward present value calculation:

$$W = \Sigma\, c_t \cdot w_t \cdot (1+R_t)$$

W is the present value (at the age of retirement) of past contributions cumulated at the effective rates of return paid by the pension system in previous years. The neutral covered wealth formula keeps track of all contributions at the individual level, and takes due account of their timing. This avoids unintended redistribution. w_t and R_t can be set in nominal or real terms, as desired. More specifically,

$c_t \cdot w_t$ = contribution amount paid t years before the pension date, which is the product of the contribution rate c_t and covered earnings w_t.

r_j = reference rate of return during the period j years before retirement. This is discussed below.

R_t = cumulative total rate of return for contributions paid in year t. It is calculated as $(1+R_t) = P_{j=1 \text{ to } t}\,(1+r_j)$ so it is the product of the "reference rates of return" r_j in all the years between the contribution date and the pensioning date.

The exact definition of the "reference rate of return" would depend on the other dimensions of design. In a conventional balanced pay-as-you-go pension system, the reference rate of return for year k would be the rate of growth of the covered wage bill in year k over the covered wage bill in year k-1. In a funded pension system investing in privately issued securities and

explicit government debt, the reference rate of return would be the return of the funds' investments. In other cases that return is fixed by contract with insurance companies.

After the pensioning date, the neutral formula we propose adjusts pensions as follows: $P_t = P_{t-1} \cdot (1+r_t)$. This can incorporate wage growth in PAYG-financed systems, or the return of investments in a funded system. To limit fluctuations, a five or ten-year moving average of the reference rate of return could be used. This replicates the fact that yields on long-term bonds are averages of short term yields.

Adoption of the neutral definition of W allows policymakers to actually choose the degree of redistribution of the pension system. Pension systems that use non-neutral covered wage formulae need to incorporate some explicit redistribution in the benefit formula just to compensate for the unintended regressive effects listed above. One explanation of the widespread use of non-neutral covered wage formulae is that pension calculations were performed by hand in most countries until a couple of decades ago, so neutral formulas were impossible to implement.

b) Redistribution through the actuarial factor.

In the above benefit formula, there is a fundamental choice to be made regarding the actuarial factor. It can be different for each individual or be uniform for all covered workers. The first option leads to individual mandatory insurance and the second option leads to "flat" insurance. Flat insurance is usually called "social" insurance, but this benign appelative usually hides regressive redistribution, as discussed below.

It is important to note that both design options for mandatory insurance meet the fundamental objective of social security, as understood by F. Blanchard, Director General of the ILO (1984): "Thanks to social security, the feeling of being protected and insured against risks has ceased to be the privilege of small minorities, and this has eliminated one of the main factors of class differentiation". That is why we prefer to use a more neutral language and call the two options regarding actuarial factors "flat" and "individual".

An example of a flat actuarial factor is the BVG mandatory occupational pension system in Switzerland. In BVG the accumulated capital must be converted into a pension (annuity) at the rate of 7.2%, which is an actuarial factor fixed by law regardless of age, sex or income level[3]. It must be stressed that the BVG system does not include explicitly redistributive provisions

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[3] Data from page 555 in *Employee Benefits in Europe and the US* (1992), edited by Howard Foster, published by Longmans, UK.

such as a minimum pension. In Switzerland redistribution is taken care of by a separate, state-run, system of basic pensions.

The consequences of choosing a flat actuarial factor are:

(i) A flat actuarial factor redistributes wealth. This happens because a flat actuarial factor does not condition on events such as sex and income class. As there is substantial information from early in active life about these events it is natural to define this as redistribution, not insurance. Specifically in the old age case, a flat actuarial factor:

* Is regressive because of the empirical fact that higher income workers have higher life expectancy at any given pensionable age. Therefore, on average it pays pensions for more years to the rich than to the poor.

* Redistributes wealth towards women, because they have a higher life expectancy than men. This may seem unfair to those that feel that living longer is a blessing.

(ii) A flat actuarial factor can provide insurance as seen from early in life, because it does not condition on events that are positively correlated with the individual actuarial factor at retirement. The two main instances are:

* The correlation between health status and life expectancy. A person can be insured against the event of being in extremely good health at the date of retirement, in which case the pension associated to the individual actuarial factor is low (Brugiavini, 1993).

* The negative correlation between the length of working life and life expectancy. A person can be insured against the event of suffering a substantial increase in the disutility of work at an early age, say 50, by having a flat actuarial factor - unadjusted by age - that pays the same pension regardless of retirement age. Of course, the presence of this insurance leads to moral hazard - in this case, declaring an end to working life just to take advantage of the higher present value of pensions - which must be dealt with by reducing insurance, as shown by Diamond and Mirlees (1978)[4].

(iii) A flat actuarial factor increases uncertainty (negative insurance) as seen from early in life, because it does not condition on events that are negatively

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[4] The combination of a flat actuarial factor and the provisions for late and early pensioning also redistribute wealth. Typically this combination redistributes wealth against those that retire after the normal age, because in all countries the increase in pensions is less than actuarial and even less than what is required to deal with moral hazard in an optimal way (Diamond and Mirlees, 1978).

correlated with the individual actuarial factor at retirement. Two instances are interesting.

* The positive correlation between lifetime wealth and life expectancy. As seen from early in life, one may be uncertain about lifetime wealth, and insurance calls for a smaller present value of pensions if a higher wealth realization occurs. However a flat actuarial factor provides the opposite: a higher present value of pensions, operating through the correlation between wealth and life expectancy.

* The correlation between the cause of invalidity and life expectancy given invalidity. As seen from early in life, one may be uncertain about life expectancy given the event of becoming an invalid. In this case insurance calls for higher pensions if an invalidity with low life expectancy occurs, to compensate the associated utility loss. However a flat actuarial factor provides no adjustment, and thus no insurance.

It may appear that the price to obtain insurance in (ii) is redistribution as in (i) and negative insurance as in (iii). Apparently Beveridge (1942) thought in those terms[5]. This is incorrect because there exist alternative arrangements to provide insurance as in (ii), without the costs of (i) and (iii). For example purchase of deferred annuities over time, say at ages 50, 55, 60 and 65, payable as from age 65, can insure the worker against unforeseeable improvements in health status.

Another attractive possibility is to have an actuarial factor <u>function</u> that is a function of sex, lifetime income and age of retirement and nothing else. This generates a flat actuarial factor for all those that have the same income, age and sex, so it insures against health shocks that may affect life expectancy or the level of pensions, as seen from early in life.

In the same way, purchase of deferred annuities whose benefit amount is conditional on the age of retirement can insure against a short working life (and impose a penalty to limit moral hazard). Both of these arrangements are

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[5] Beveridge (1942) reports that the bulk of public opinion in Britain in 1941-42 thought that unemployment insurance should not charge different premiums to workers in industries with different risk of unemployment. The reason offered was that the volume of unemployment in any industry is not under its control, and that those that are fortunate in being regular should share the cost of unemployment in those which are less regular. This argument ignores that people choose their industry of employment and that they may require a compensating wage differential from those that offer less regular employment. The required compensation may be reduced or eliminated by cross-subsidies based on a flat actuarial factor. This leaves workers equally well-off, but eliminates the labor market penalization for employers that offer less regular jobs.

based on an individual actuarial factor as of the age of purchase, so flat actuarial factors are avoided.

The conclusion is that the costs and benefits of flat actuarial factors should be unbundled, so that only their desirable features are retained. Therefore, Beveridge's (1942) proposal of adopting flat premiums without qualification is inefficient. It is unfortunate that this proposal was adopted by most OECD countries, where the actuarial factor is a constant that ranges between 0.01 and 0.02 per year (OECD, 1988). For the same reason, there is no basis for the proposition that a "two-tier" pension system with a flat actuarial factor for the first tier and an individually-adjusted actuarial factor in the second is optimal.

Countries should adjust premiums to some risks, and pool through an actuarial function for other risks. A freely operating market will generate some pooling in any case, because detailed risk identification can be very costly. For example, in Chile the actuarial factor in old-age annuities is determined at the individual level, but in market practice it is a function of age and sex and not of the outcome of medical examinations, at least up to now. Although the prices of invalidity annuities are adjusted by the cause of invalidity, there is no objection because it is felt that this provides desirable insurance.

The political economy of flat actuarial factors also deserves mention. Flat actuarial factors are not unique in their ability to redistribute wealth, because explicit taxes and transfers can also achieve that end, but are unique in generating hidden redistributions. When confronted with a proposal to redistribute wealth through flat actuarial factors, one can ask why the same redistribution is not proposed to be effected explicitly, through taxes and transfers. In OECD countries, a typical reaction is that less redistribution would be achieved in that way, due to political constraints. However, it is precisely the limited political constraints associated with flat actuarial factors that has made them very popular with pressure groups, who can obtain large redistributions without the public noticing. For example, in the old pension system in Chile, copper miners, which were provided the best health services and industrial security in the country, obtained legislative approval for early retirement by ten years, on account of "harsh working conditions", without a reduction in the actuarial factor. It is unclear if that policy would have passed if explicit taxes and transfers had been required.

2.3 The value of sophisticated insurance

This section discusses the problems of moral hazard and adverse selection in the new insurance sevices associated to flat actuarial factors.

a) Insurance for the event of a short working life. As explained before, the date at which earnings must begin to be replaced by pension income is stochastic from an individual point of view.

Insurance against this uncertainty requires linking the date of pensioning to the date and degree of withdrawal from the labor force, as this defines the loss of earnings. However, this insurance induces moral hazard, as workers may bring forward the date and degree of their retirement just to collect pension payments for more years. Moral hazard occurs because the actual disutility of labor at any age - which determines the duration of working life - is not observable by the pension system, but it is observed by the worker. The existence of moral hazard implies that full insurance against this risk is undesirable, but it can also be proved that some insurance is desirable.

No country has yet implemented efficient insurance against a short working life. Simulations suggest that very stiff penalties for early retirement and very large bonuses for late retirement are needed, with a general shape quite different from what is observed in the OECD. Another feature is that as individuals may use the capital market to save and limit the consumption cost of the penalty for early retirement, it would also be desirable to tax savings, which is counter-intuitive (Diamond and Mirlees, 1978)[6]. As the income tax system, the safety net and invalidity coverage already provide some degree of insurance against a short working life, the penalties and bonuses mentioned here would have to be netted out.

This insurance is even less feasible when earnings and the degree of retirement are not observable. In many developing countries employment as a dependent worker in the formal sector is the only observable variable. Earnings cannot be monitored. This is certainly the case in most developing countries, where labor mobility between the formal, urban informal and subsistence agricultural sectors is large. In these countries most people are unable to file individual income tax returns, so it is not possible to use tax information to observe employment either. If insurance againt a short working life is attempted in this setting, workers will declare they have retired to collect pensions, but would still continue working in the informal sectors. For this reason, this type of insurance appears interesting only for countries with a very high degree of formality in their labor market.

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[6] This is true only for non-myopic, well informed consumers with full self-control.

b) Insurance against future health status. As explained before, a pension system that calculates an annuity at age 65 based on current life expectancy leaves the worker exposed to the risk of having good health status. At age 65 workers have more information about their own life expectancy, because their medical history will have unfolded. The result is that the risk of having very good health at age 65 is not insured against.

This risk can be diversified over time if workers purchase deferred annuities over time, if the price of annuities is adjusted as health status changes. Another answer is a fixed annuity purchase plan starting at a young age, that assumes average evolution of health status. It would compensate the higher costs of covering those with unusually good health status with the lower costs of covering those with below average health status.

This extra insurance is subject to difficult problems, so its desirability can be questioned. In the first place, the costs of continuous health examinations must be substacted from the insurancebenefits. Moreover, private insurance companies are wary of extensive health examinations because their personnel becomes prone to exercise favoritism towards clients which are in poor health, by ignoring or delaying medical exams. Even worse, manipulation of medical information by doctors who want to help out their patients is widespread.

Another form of moral hazard may be very damaging in developing countries, where continuous contribution to a fixed annuity purchase plan starting at a young age is infrequent. The movements of individuals in and out of formal employment would be influenced by the presence of this insurance. Only those that remain healthy would continue contributing, while those that begin to suffer poor health would move to the informal sector to escape the increase in premiums needed to transfer resources to those in good health.

Summing up, the secondary types of insurance provided by flat actuarial factors do not seem to be valuable in many countries.

2.4 Financial Guarantees and DC versus DB.

We will now compare benefit formulas from the point of view of risk sharing. Looking from early in active life, future wages and future "reference rates of return" are unknown. Both enter into the determination of the covered wage W, according to the neutral formula. In addition, the actuarial factor is uncertain, because it depends of the projections, at the age of retirement, of income sources available then, i.e. the rates of return available from then onwards. This is apart from health status and other factors that make the actuarial factor uncertain, treated in 2.3.

Defined-benefit (DB) plans offer guarantees against some of these risks. These plans are a contract between the worker and an entity - which may be the employer or the government - to pay a pension fixed by contract if the contribution and retirement conditions are met. In the standard DB plan, the promised pension uses as covered wage the last wage while employed. Defined contribution (DC) plans are a simple accumulation account whose balance can be withdrawn when certain conditions are met. Withdrawal can be phased over time or for the purchase of an annuity.

Some authors argue that since DB plans offer guarantees to workers, and they are more risk averse than employers or the government, then DB plans are superior to DC plans. This argument is incorrect for the standard DB plan. At any point in time, all the variables that enter the benefit formulas are random, except past wages. The fact that future wages are uncertain means that the standard DB formula pays very risky benefits. The common denomination of this formula as "defined" benefit is inexact. On the other hand, DC formulas generate a pension from averages of many random variables, namely future wages and future rates of return. This implies, by the law of large numbers, that there is significant averaging, and the resulting pension may be more stable than the one resulting from the standard DB plan. It is clear then that standard DB plans are inefficient from the risk-sharing perspective. The natural starting point for DB plans should be the neutral formula for the covered wage.

The question is which guarantees would be added to the neutral covered wage formula to achieve points in the risk-return frontier for pensions that are attractive to workers. A DC plan offers a point in that frontier that may have too much risk, and thus be rejected by workers over less risky points.

Government insurance of pensions

Risk-sharing with workers can be obtained in two fundamental ways: by trading in the financial market, and by guarantees issued and sold by the country's government. For this purposes, we include the guarantees issued by employers in favor of their employees to be a sort of financial contract with different transaction costs. Both the financial market and the government are abstract mechanisms, and in the end all risks are absorbed by some agent, be it the shareholder of an insurance company or the taxpayer. This shows that the option of having the government issue guarantees to pensioners at zero price is inefficient, since this ignores the cost to taxpayers of absorbing the residual fiscal risk. We will assume now that the government either charges for the risk absorbed or regulates risk-taking activities to reduce its cost to almost zero.

Consider now some points regarding the appropriate role for government insurance of pensions. An efficient allocation of risk involves three conditions: (i) full exploitation of diversification possibilities; (ii) allocation of

the residual risks to those that can bear them at minimum costs; and (iii) minimum costs of information, of processing and of inefficiencies due to market power.

Although it is difficult to generalize, it seems that a financial market relatively integrated to the international capital market and the governments of large countries have similar ability to exploit diversification possibilities. The conclusion is that for small countries the guarantees available in financial markets dominate government guarantees.

On the second point, financial markets are clearly adept at allocating residual risks to those that wish to bear them at minimum costs. The political process is adept at shifting the residual fiscal risks towards those taxpayers or transfer recipients with less representation and voice, which is usually a quite different set of people. This suggests that on this count the financial market may be superior.

On the third point, the open financial market can be worse than government guarantees because of high processing and information costs. Employers may have lower transaction costs, but be worse also because many have some market power with regards to their employees. This market power may show up as a large wage reduction for risk averse workers who prefer a stable employment and desire to transfer their pension investment risks to others.

Summing up, government insurance of risks may be an attractive option in the case of large countries, provided that recipients are charged for this service.

Existing Financial Markets

Another important point is that there is a substantial difference between existing financial markets for specific sources of risk. The market for defined-benefit plans offers an all-or-nothing investment guarantee, with no intermediate degrees. The market for financial guarantees, on the other hand, offers a large array of partial guarantees, including non-linear risk-sharing formulas. Partial insurance may be made age-dependent by allowing people near pensioning to shift towards a safer investment portfolio, i.e. heavily weighted to fixed-income CPI-indexed securities.

This difference is important because the high cost of full guarantees. A full guarantee of a long-term pension is very expensive, because the number of events that may make the insurer suffer a loss is so large that precise calculations are not available, and the fear of uncertainty reduces the supply of willing insurers. As the volume of guarantees offered at low prices is likely to be much smaller than the volume of guarantees required by a national pension system, the market price of full insurance is bound to be very expensive.

Therefore, unless pensioners exhibit zero risk tolerance, they should be willing to bear at least some risk in exchange for a higher expected return. This suggests that most individual workers may be better off with a partial guarantee. The precise design of that guarantee may depend of the existing financial markets, the size of the government, and the ability of the government to shift risk to taxpayer efficiently.

2.5 Inter-generational Insurance.

Insurance of this type refers to risk-sharing between generations. Important events that can be covered are the risk of being born into a unusually numerous generation, and the risk of belonging to an unusually long-lived generation.

Market exchange provides intergenerational insurance, regardless of the type of pension system in force. For example, the event of being born in an uncommonly numerous cohort generates predictable effects in equilibrium prices: first, real wages will be depressed while this cohort lives out its active stage. That will induce a reduction in labor supply from other cohorts and a shift by firms towards more labor-intensive production techniques. These and other market adjustments reduce the extent to which wages are depressed for the unlucky cohort, providing partial insurance. When this cohort retires and starts selling assets equilibrium rates of return will rise transitorily. Asset prices will fall but will be expected to recover over the longer term. This will induce a transitory increase in saving by the young that will reduce the extent to which asset prices fall, providing partial insurance.

If the numerous cohort includes only those born in one or a couple of years, then there will be many contemporaneous generations and insurance will be almost complete. Insurance is much more limited if the numerous cohort covers those born over fifty years. The reason is that a more permanent shock to fertility is harder to insure than a very transitory one. In an open economy the situation is much more favorable, because market exchange with contemporaneous groups that reside in other countries can provide substantial insurance. If the capital account is open, fluctuations in domestic asset prices will be much smaller. The response to the appearance of a numerous generation will be a fluctuation in net external assets. A part of the real wage fluctuations can be moderated by international migration. A small country achieves substantial insurance through market exchange.

In a large semi-closed economy, a mandatory pension system can provide additional insurance or undo part of the insurance provided by the market mechanism, depending of its design. If the pension system is fully funded (fully invested in outside assets like public and private physical capital, private sector securities and foreign securities) then the induced fluctuation in asset prices will be as described above, and market exchange with contemporaneous generations will provide insurance.

A balanced pay-as-you-go pension system may supplement or subtract from market-provided insurance. When such a pension system is in force, being born in a specially numerous generation implies that the burden of supporting the previous generation is spread among more persons, so the contribution rate can be reduced. If in fact contributions are reduced, this compensates in part the reduction in the gross wage originating in the increased supply of labor. However, the contribution rate will have to rise in the future (transitorily) by more than what it is first reduced, to finance the retirement benefits of the numerous generation. If this actually happens, this shifts part of the financial risk to the subsequent generations.

More frequently, the political system manages balanced PAYG systems to subtract from market-provided insurance. The contribution rate is typically maintained while the numerous generation is active and the additional revenue is spent raising benefits. This reduces the capital stock and reduces real wages further, making members of the numerous generation even worse off. As the numerous generation ages, the contribution rate must rise very substantially to honor the higher benefit levels[7]. This implies that the risk of default on pension entitlements by the next generation rises considerably. In a conventional government-managed pension system, default could take the form of legislated increases in the pensionable age or less than full adjustment of pensions for past inflation. Once this process is set in motion, inter-generational insurance is abandoned and nothing prevents benefit levels from being reduced substantially. If the new higher benefits are honored, the subsequent generations will get a lot of the risk and will be saddled with a reduced capital stock per worker. At the individual level, a PAYG pension system with these dynamics increases uncertainty and undoes part of the insurance available through the price mechanism.

A mixed alternative is to save the additional revenue raised while the numerous generations is active. This may require reforms in other design dimensions to be effective, as the US experience shows. In that country, a trust fund was legislated in 1983 for this purpose, but 100% of the funds were invested in non-tradable treasury debt. Apparently the US government has increased its budget deficit, rather than reduce it as it would be required, because of the availability of easy finance from the trust fund (Leonard, 1990) [8]. Because of this arrangement, the next generation in the US has avoided a large increase in social security contributions, but instead faces a substantial increase in taxes to service the debt to the social security trust fund. As this may provoke default, individual uncertainty may have increased.

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[7] Although the contribution rate rises transitorily, it must still remain at a long-run level higher than the initial level, because benefits were raised.

[8] This can be seem in the fact that the Gramm-Rudman Deficit Reduction Act defined budget targets in terms of the ordinary budget and the social security surplus combined.

A much better mechanism for inter-generational insurance in a semi-closed economy is fiscal policy that changes the explicit public debt. If a given generation appears unlucky, the government can subsidize it and finance the expenses by issuing public debt. If another generation is considered lucky, it can be taxed and the proceeds used to reduce the public debt. This approach is not contractual in nature and relies on ex-post benevolence. Although it is also vulnerable to political manipulation, it has the advantage of being explicit, transparent and much more targeted, as compared to the intergenerational transfers originated in a PAYG-financed pension system. In this context, the meaning of targeting is that just the generations identified as needy are helped, and not the whole set of those currently alive as when the contribution rate is raised in a balanced PAYG system.

This analysis suggests that a conventional PAYG pension system managed by the political system is a cumbersome and unpredictable instrument for achieving inter-generational insurance. It appears wiser to provide this type of insurance using market exchange with contemporaneous generations and specific decisions to change the public debt, each one targeted to a specific source of inter-generational inequity.

2.6 Partial Coverage and individual insurance.

Mandatory pension systems are mandatory only for workers that can be forced to contribute, which in most developing countries exclude the self-employed, individual entrepreneurs and the informal sector.

In practice, substantial job rotation in and out of the covered sector implies that many workers will contribute sporadically, i.e. in the periods in which they work in the formal sector. Some of them will accumulate few pension entitlements and most of the time they will not be fully covered by invalidity and survivors insurance. The state is simply unable to mandate earnings-related pensions for a substantial number of workers.

From an insurance point of view, this means that the mandatory pension system does not offer a substantial reduction in risk to many of these workers. The social benefit will be smaller if the design of the pension system provides low quality insurance from the individual's point of view. This outcome is made worse by provisions that impose a minimum number of years of contribution to obtain entitlements to an old-age pension. These provisions reduce substantially the value of contributions for workers that rotate randomly into the informal sector[9].

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[9] Those provisions may also reduce the incentive to undersave for old age created by the existence of a basic pension, but that happens only if basic pensions are limited to contributors to the earnings-related pension system. That is not desirable in general because basic pensions require an independent design based on its own logic (see section 2.1).

The provisions that make coverage for invalidity and survivorship contingent only on the duration of the last spell of work at the formal sector also increase uncertainty at the individual level. Both cut the contribution-benefit link, generating a disincentive to work in the formal sector.

The implication is that these provisions must be designed taking into account the degree of job rotation nto the formal sector. For example, coverage for invalidity and survivorship can be defined on the basis of the average of contributions over a longer period, such as ten years. Another possibility is to give priority to invalidity and survivorship coverage. More permanent coverage of these risks may be achieved for infrequent contributors by automatically drawing down the rights they have accumulated for the old-age pension to finance continuous insurance coverage.

The fact that administration costs are positive and sometimes significant argues in favor of an exemption from contributions to workers of the formal sector that exhibit a low enough density of contributions in the past.

3. The Second Design Dimension: Privatization

Privatization is a second design dimension in earnings-related mandatory pension systems, which is independent from insurance design and funding, although some interactions exist.

There are two types of privatization: (a) contracting out of services to private providers, including fund management if funds exist and purchase of insurance and reinsurance. For example, a small country may wish to reinsure part of its invalidity and survivorship risk abroad. (b) Creation of a market in pension provision, which combines private provision with private choice among providers. This avoids dependence of providers from procurement contracts awarded by the political system. In this alternative, the government regulates several aspects of private choice and provision. This section discusses both types of privatization.

3.1 Nationalization of insurance and savings provision

This subsection reviews the potential problems associated with the competitive production of insurance to determine if the set of appropriate policy responses includes nationalization of production. In many cases nationalization is unwarranted. This review will follow the classification of insurance policies established in the previous section.

Forced saving for old age: There are many privately-managed saving vehicles available in the capital market. In many countries the market failures that

affect bank deposits and mutual funds have been dealt with independent regulation. Competitive private provision can produce this service efficiently.

Inflation Guarantee: As discussed in section 2.1, these guarantees can be provided by local issuers of fixed-income securities, such as the private sector and the government, provided this type of financial contracts are allowed by the government to financial intermediaries.

Longevity insurance: A potentially damaging problem here is adverse selection[10]. Those that have private information that their life expectancy is below-average may choose not to purchase an annuity, raising the cost for those with average life expectancy. This cost increase can induce the latter not to purchase annuities, worsening the cost problem. If adverse selection is important, one possible government intervention is mandatory purchase of annuities. This could be opposed by the workers that want to leave a bequest. One solution is to allow partial bequests in annuity contracts. For example, authorized annuities may be required to include a minimum of, say, ten years of payment even if the insured person dies before. As international experience with the automobile insurance market shows, there is no case for nationalization of provision.

Invalidity and Survivors' insurance: The adverse selection problem here refers to the possibility that those who receive information of being high risks may choose higher amounts of this insurance or migrate to the formal sector and vice versa. Again, mandating purchase of a fixed amount of coverage, which at the individual level may be a function of average earnings, solves the first problem.

One approach to the problem of migration to the informal sector is to bundle the provision of this insurance with other insurance lines, so that the losers in one insurance line gain in another line. For example, invalidity and survivorship insurance may be bundled with health insurance and worker accidents and professional diseases insurance. This reduces substantially the incentive to move to the informal sector.

Observability: Observation of some events, such as death, may be a natural monopoly for the government. However, the government may solve these problems without nationalizing insurance provision. Observability of death can be provided by the civil registries. Observation of the resumption of work by somebody declared invalid may be a natural monopoly for the

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[10] The magnitude of this damage is hard to measure. Warshawsky (1987) argues that the cost of adverse selection in the United States private annuities markets is between 8% and 16% of the annuity amount, but he assumes that life insurance companies adjust their prices to only two ex-ante observables: age and sex.

government in countries with small informal sectors, but it can sell this information service at cost to private competitive insurers.

Portfolio Diversification: Private competitive providers offer portfolio diversification services regularly in the capital market. Moreover, international diversification seems to be an area where private providers have an advantage over nationalized providers exposed to political pressures.

Other services: Private competitive providers can efficiently produce services such as record-keeping of individual accounts, collection of contributions and payment of monthly pensions, as shown by private banking systems around the world[11]. Although some functions exhibit economies of scale, such as collection of contributions, the private sector can use the institutions it has used in the banking sector for decades, such as clearinghouses under common ownership and coordinated legal persecution of employers that delay payment of contributions. More efficient still is to allow private providers to piggy-back on the existing banking clearinghouse.

Financial Guarantees: An important issue for workers is the relative value of public versus private guarantees for their pension income. It is a standard argument that the government can provide better guarantees at lower cost than the private sector, because the government can pool more risks. This is untrue in many developing countries, where the credit standing of the government is worse than that of leading private firms. In many of the countries where the government keeps fiscal balance, this is achieved by constant changes in tax rates and in government transfers. As pension benefits are a prime target for deficit reduction in many countries, it can be seen that the value of a government guarantee of pension income is heavily dependent of the features of the local political process.

International experience shows that governments are less likely to default on their explicit public debt than on their pension promises. This suggests that private portfolio managers can achieve a better combination of risk and return by choosing a portfolio that includes government bonds and private sector securities, than the combination associated to 100% reliance on pension promises by the government. This shows that private provision is compatible with partial reliance on the government's abilities to pool risk and to change taxes.

The main conclusion is that there is no economic argument for nationalization of the pension provision industry. Although some pension authors, have stated that "just about all observers have accepted social insurance as a legitimate role for government, .. so the fact that most OECD countries have public provision of insurance is not surprising" (Munnel,

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[11] This point is due to Klaus Schmidt-Hebbel.

1987) these statements are simply ungrounded. Although there are no efficiency argument against nationalization, political economy analyses of public ownership offer reasons to oppose nationalization.

3.2 Private selection of pension providers

This section discusses the demand side of a market in pensions services. Privatization of demand is controversial because of two reasons: potential incompatibility with mandates to improvident workers, and potentially high administrative costs. We review these objections in turn.

a) Individual versus group selection of provider.

As demand is mandated by the government, it is natural to ask whether the government must necessarily select the providers. As argued in the companion paper (Valdés-Prieto, 1993), if the government mandates pensions because of worker improvidence, then the essence of the government's role is to assure that improvident individuals obtain and follow benevolent advice on pension matters at low cost. Individual improvidence justifies a government-mandated transfer of that responsibility to a trustee system with the potential to improve on individual decisions, but it does not require that the government itself make those decisions. Therefore, private selection of provider is conceptually compatible with mandatory pensions if the individual worker is still constrained to make saving and insurance decisions with appropriate effort devoted to their analysis.

If the government mandates pensions only to avoid future pressures by influential older groups that push for subsidies, the situation is straightforward: providers can be chosen directly by workers, without trustees. This may be the case of state pensions for the military, or for civil service employees.

In other words, mandatory savings and insurance does not imply government selection of providers. For those workers that are able to perform the selection job for themselves, individual choice of provider should be allowed. For the set of improvident workers with little political clout, mandatory savings and insurance only implies that selection must be transferred to trustees. Unfortunately, this fundamental distinction is acknowledged very infrequently.

When choosing between the more complex insurance services, workers can hire licensed financial advisers[12].

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[12] The limitation here is that regulation of advisors' fiduciary duties may prove costly and ineffective. In addition, advisors themselves must incur in marketing expenditures. However, trustees may hire advisors to serve the whole set of their members at group rates.

However, forcing improvident workers to choose individually is a contradiction. Such workers should only be mandated to contribute because they are improvident, i.e. if they are misinformed, or if they lack self control or if they behave myopically towards old-age saving. As improvidence justifies government intervention in their pension decisions in the first place, it must be expected that improvident workers forced to choose provider by themselves will act in an improvident way or will evade contributions.

For example, myopic contributors will tend to prefer private providers that charge commissions that are deducted from future pension benefits over providers that charge commissions deducted from the current after-tax wage. Myopic contributors will invest too little in search and in education to choose better among providers, because the benefits from such search are received in the heavily discounted retirement period[13]. Misinformed workers may compare performance among fund managers looking only at the ranking of past returns, without looking at the ranking of the variance of past returns[14]. Miscalculating workers may be unable to trade off the smaller flat commission charged by one fund manager for its smaller expected return[15]. Workers that lack self-control may find it hard to resist an attractive salesperson that offers a small gift for switching to a different insurer. If improvidence justifies mandatory insurance, then individual workers should be expected to act improvidently when choosing provider by themselves.

This is a central problem with the new Chilean pension system, where workers are expected to choose provider on an individual basis. The ensuing problems were predicted in Chile in 1980 by local union leaders: "Workers will not know how to make this decision. They don't have the necessary elements for judging. It is likely they will not even become interested in it. Many people do not know how to read and barely know about numbers..." (Piñera, 1991, p. 96)[16]. Of course, that prediction was self-interested, as union leaders were trying to obtain a legal exclusivity to act as pension trustees.

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13 This argument is due to Augusto Iglesias.

14 This point is due to Eduardo Walker.

15 This point is due to Jorge Claro, who since 1984 has stressed the difficulty to compare among fund management companies.

16 Piñera (1991) argues this assertion by union leaders embodied arrogant contempt of individual liberty and autonomy of workers (p. 96). This is because he argues that the only purpose of mandatory contributions is to reduce the fiscal cost of goverment-financed basic pensions (p. 68). But any tax can perform that simple function, so his argument does not stand.

b) Private versus government trustees.

Trustees may be private or public. In the nationalization option, some official body whose members are appointed by the political system -- the president, parliament, political parties, national federations of employers and labor unions -- chooses private providers of services such as a portfolio management, insurance, financial guarantees, record-keeping, collection and payment. In the private option, providers are chosen by private trustees that represent natural groupings of workers, such as those with the same employer or those living in the same municipality.

The Political Economy of Public Trustees

Nationalized trustees means that some official body whose members are appointed by the political system chooses private providers of pension services, while workers are allocated by law to an official body. The official body could be one -- a monopoly, as in Malaysia and Singapore -- or there could be several official bodies (there are three in the case of Sweden). If they are many, they could be defined along territorial lines -- municipalities or provinces[17] -- or according to the industry of employment -- banking sector, port and rail workers, steel and coal workers --.

As recommended by the ILO, conventional Social Security Institutions (SSIs) are public agencies that have a mixed "public-private" board defined along industry of employment lines. The ILO-style board, however, is fully drawn from the political establishment, because it includes both government officials and other designated by the national associations of unions and employers. Such national associations are in many countries part of the political establishment.

The international experience with ILO-style SSIs, which dominate pension systems in Latin America, Southern Europe and the Middle East, has been dismal. The members of the board of an SSI do not have a mandate from contributors to maximize performance, because contributors are simply assigned to the SSI. On the other hand, the board has an obvious mandate to serve the interests of the organizations who placed them there, namely political parties, national labor unions or national employer associations, all members of the political establishment. The result is that many SSIs have not defended their contributors' interests successfully, but have facilitated the channeling of the surpluses of the first decades towards the government, also dominated by the political establishment.

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[17] This was suggested by Diamond(1992) for health. A similar proposal was offered by Bitrán(1992) for pensions for small countries such as Paraguay.

The nationalization option also includes variants that limit the influence of the political system over the official trustees in charge of selection of private providers. Board members can be given tenure of their post. Independence can be buttressed with staggered long-term service periods, as in the case of some Central Banks. Accountability can be increased by charging board members with fiduciary responsibilities. Revision by independent auditors hired by a different branch of government can be added. Finally, different pension services may be in charge of different official bodies. For example, collection and payment services may be offered for bids at the municipal level by one set of official bodies, while the purchase of financial guarantees or the portfolio strategy may be decided by another set of bodies at the regional level.

An objection to nationalization is that trustees designated by the political system will be sensitive to pressures to allocate investments according to the authorities' preferences. The Swedish experience in 1959-1983 with the AP-funds is the best example of this. The centre-right parties in Sweden refused to accept that the AP-funds could hold equity because of its implications for corporate control. In addition, they opposed that it would choose corporate bonds freely. The final arrangement was that the AP-funds agreed to follow the Central Bank's investment guidelines, which in turn left the bond selection process in the hand of the two large private sector banks. The final result is that the AP-funds return has been 3-4% per year below comparable rates of return in the Swedish economy (OECD 1988; Munnell and Ebensberger, 1990; Pontusson, 1984).

In the United States, some trustees of pension funds managed by elected officials on behalf of state employees have endorsed "socially targeted investments"[18]. These are investments that further public policy goals, like helping students with loans, lending for the construction of affordable apartments for low-income families and retraining of unemployed workers. One such official has recently stated that "the traditional argument that investment return suffers when external positive values are considered is wrong"[19].

Private Trustees

Given these problems, the option of private trustees merits detailed analysis. In this case the issue is how to allocate workers to trustees. If individual workers were allowed to choose a trustee, they can be expected to choose improvidently. Specifically, if trusteeship were a for-profit free-entry activity, we should expect a replication of the outcome with individual selection of provider.

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18 The Washington Post, December 9, 1992, page F2.

19 She said that "I am hopeful that, under President Clinton, those fallacies will be exposed".

On the other hand, direct allocation of workers to private trustees raises the possibility of abuse. For example, if employers are required to act as trustees, they may abuse by choosing providers that offer bribes or favors - low interest loans, free financial services - at the cost of sacrificing services rendered to workers. This is a widespread concern in developing countries.

The OECD experience is useful here. In 1985, Switzerland mandated all employers to choose a fund manager and insurers for earnings-related retirement pensions of their employees (OECD, 1988). There are no reports of abuse by employers. In 1992 Australia legislated a similar mandate, with the difference that unions would be the sponsors of groups. In most OECD countries, employers are allowed to set up pension schemes for their employees ("private pensions"). These pension schemes could be subject to abuse or outright theft, as in the recent case of Maxwell in the United Kingdom, but this has been the exception rather than the norm.

This suggests that there exist organizational alternatives where the risk of abuse by the employer can be reduced significantly. In this regard, it is notable that Swiss law requires employers to "set up their own scheme, which usually taker the form of a foundation. Mutual funds are also possible but less common. The important point is that the pension scheme has to be a legally independent entity and may not be part of the employer's company." (Kunz, 1991)

Other examples of this approach are given by worker accident insurance. In several countries this coverage is managed by employers, but only through a specific mutual benefit society whose only purpose is to provide these services to the workers in member firms. Employers are mandated to cover their workers and to choose one such mutual benefit society. Of course, the analogy is not direct because these societies do not limit themselves to the role of trustee, and also enter directly into the production of insurance and medical services.

We conclude that private trustees should be organized along the following lines: (a) Not-for-profit foundations formed by employers, with a board of trustees chosen by the members (employers and some union representatives); (b) The role of these foundations would be to hire fund managers, to hire an insurance company that provided invalidity and survivorship coverage, and to hire a processing company to collect contributions, pay benefits and provide other administrative services to the workers. The foundations themselves would be banned from producing these services; (c) There should be regulations on these private foundations.

The risk of employer abuse is greatly reduced because the foundation cannot obtain equivalent favors for all its member firms. For abusers, this raises the risk of internal strife and detection of abuse by the authorities. On the other hand, member firms have a common interest in cost reduction and the

obtention of better service for workers, because this reduces their labor costs, so they will give the appropriate signals to board members.

High labor and firm mobility is not a problem in this scheme, because at most the mutual benefit societies would be charged with the responsibility of choosing trustees for ex- employees that left member firms in the distant past but who have not joined another formal employer yet.

Regulations on Private Foundations

Regulation is appropriate when the performance of private trustees can be improved joining the forces of the private and public sectors. For example, the employers can provide the trustees and the government can apply regulations regarding their fiduciary responsibilities, as those imposed by the ERISA law in the United States since 1974.

To prevent abuse in the selection of providers, it is essential to impose a minimum diversification requirement that assures the independence of the board of trustees from any specific employer or union. Specifically, a regulation would prevent any single employer, any single union, and any set of employers affiliated into a single business group, from choosing more than one member of the board of trustees.

Regulations must also prevent trustees from becoming financial intermediaries that charge commissions, because in that case improvident workers would not have access to truly benevolent trustees.

Regulations should also allow workers that are willing to endure the costs of choosing providers for themselves, and that have shown that they are provident[20], to do so.

Finally, there should be limits on the size of each foundation, measured by the number of workers, to avoid monopsony power.

Residual Groups

In some developing countries this organizational scheme may be insufficient. On the one hand, a large proportion of workers at a given point in time is working in the informal and subsistence sectors, or has exited the domestic labor force towards household work or has migrated. In addition, the majority of employers do not belong to trade associations at all, and fewer still

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20 A worker that has saved voluntarily into an account whose funds can only be drawn at retirement can be deemed provident. A test of accumulating two or three months worth of salary into such acounts to qualify for voluntary contribution is easily implementable.

belong to trade associations with the ability to provide effective boards of trustees.

In this setting, some formal sector employers may be unable to provide trustees to give trustee services to their workers. This does not imply that the government should provide trustees itself, but only that default groups could be arranged by the government. Workers that do not belong to an employer-sponsored foundations would be allocated to the default groups.

The existence of a population of private foundations opens up additional mechanisms to limit the influence of the political system over the default groups. It becomes possible to eliminate the discretion of government officials in the most sensitive matters. For example, in a funded pension system, the fund management decision of the default groups can be defined by statute to equal the average of the decisions of all private foundations. That is, private foundations would choose fund management companies, and the default groups would distribute their funds across fund management companies according to their share in the private foundation market.

In the case of Chile, for example, we guess that default groups would own much less than half of total funds. This guess is based on the fact that in June 1992 the 77% of workers with smaller individual account balances owned merely 24% of the total funds[21]. In other countries, where the default groups may own more than half of the funds, this alternative may not work. Other pension services, such as selection of the provider of collection and payment services at the municipal level, can be left to a local official body without much risk to workers.

Of course, in some countries regulated private foundations may still be too few in comparison to the residual groups, so this mix may not work. As this usually occurs in countries where the political system produces untrustworthy and improvident trustees, such countries may be better off without mandatory earnings-related pensions.

If society cannot produce enough provident and trustworthy trustees, then little improvement over individual improvidence is possible. At most the government can legislate the simplest short-term insurance products, such as disability and death insurance, that can be operated reasonably well even by an imprudent government. Legislating an old-age annuity system under the control of an improvident political system or corrupt private trustees is clearly imprudent.

Summing up, we have shown that there are political economy arguments that recommend privatization of the selection of provider. The advantages of

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21 Boletín Superintendencia de AFP Nº 111, p. 59.

promoting a private population of foundations are: (a) it reduces political interference in the selection of trustees to a minimum; (b) it allows new methods to limit political interference in the management of default groups; and (c) it allows the overall share of private trustees to rise automatically with economic development over time. There is no reason to believe a private foundation/ trustee system to be more expensive tc operate than a nationalized trustee system, because both require a number of regulations to prevent conflicts of interest and abuses.

c) High Administrative Costs of Private Selection

The second argument for nationalizing demand is that in this area legislation fixes all the relevant aspects of the insurance contracts except price. In this setting, opening choice of provider to the private sector would be unnecessary and inefficient. Inefficiency would result because this choice attracts expenditures in advertising and salespeople, whose role is to direct more demand to specific providers. This expenditure is wasteful because by assumption legislation has eliminated the differences between providers, so no judgment must be exercised. Price may be determined more efficiently in simple auctions.

This argument fails if the services rendered by different providers are not identical, because there is potential for a tradeoff of quality for price. In addition, the pressure of salespeople contribute also to inform workers and reduce improvidence.

However, if the quality differences are small and perceived differences are mostly generated by persuasion, either through salespeople or advertising, the argument still stands. This is the case in instances where verifiable quality has been regulated or legislated, so that the differences in verifiable quality become negligible. The costs of free consumer choice by individual workers bears this criticism out, as shown by the Chilean experience of high marketing expenditures and their tilt towards persuasion by salespeople (Arrau, Valdés-Prieto and Schmidt-Hebbel,1993).

However, in several cases the individual is called to exercise judgment when choosing provider even when benefits are legislated. The most obvious example is portfolio selection and insurance company selection. In these cases private choice is expected to be superior to political choice. Differences in judgment are a form of heterogeneity in tastes, and their satisfaction is a well-established advantage of private markets over choice by politicians. It is appropriate to sacrifice economies of scale to obtain more variety to fit differences in judgment about portfolios and solvency of insurance companies. In this case, there is a tradeoff between allowing individual choice and accepting high administrative charges.

This dilemma disappears when private choice is exercised by the boards of foundations designated by employers. The experience in the OECD with this type of private demander is that advertising expenditure is minimal. As private choice through foundations decentralized judgment at little administrative cost, it is the best combination.

However, in pension systems where 100% of the contributions must be invested in pension promises issued by the government (PAYG systems) a significant area for judgment is absent. As the other dimensions of quality may be specified through regulations, it may become more efficient for the government to choose providers in an auction.

Even this conclusion is debatable when we consider technical progress: Given that portfolio judgement decisions are absent, which is the optimal location of authority to improve the pension contract over time ? Two polar alternatives are to keep all decisions at the level of the legislature, and to transfer power to the private foundations. In intermediate alternatives some decisions are transferred and others are kept by the legislature.

The fully legislated approach assumes that the government is able to produce the best available legislation every year, maybe using the best technical experts available. However, this would be convincing only if (a) expert advice will dominate the legislative outcome; (b) insurance and savings legislation can specify a large number of contingencies in advance; and (c) the government is able to implement sound long-term saving and insurance policies. In many countries these assumptions have failed. Therefore, there would be an improvement in dynamic terms if some of these decisions are transferred outside the political system.

We favor an intermediate approach. For example, the responsibility of setting the contribution rate and designing new annuity products can be transferred to trustees of private foundations. Another example is the design of financial guarantees where the guaranteeing company allows the private foundation to have some say on the procedures to select fund managers. This is most convenient in those areas where transfer of responsibility outside the political system is valuable and where individual tastes and judgments vary significantly. Still, general legislation should define some features of the insurance and savings products to assure portability for workers that shift between foundations.

3.3 Other Regulatory Requirements of Privatization

The development of a private market in pension services such as fund management and insurance requires a judicious mixture of complementary laws and on-going regulation by an official supervisory body. As explained in section 4, these services and the associated regulations are necessary ven in an unfunded pension system, if workers are not forced to invest 100% of their

old age savings in government bonds. Providers of other services, such as recordkeeping or contribution collection, can be subject to much simpler regulations.

Regulations to prevent exploitation by fund managers

A design that only prevents exploitation of workers by the political system can fail, because abuse by private fund managers and insurers can also damage affiliates.

Consider the experience of Alaska. The employees of the State of Alaska quit the US Social Security System after a referendum in 1980, because actuarial studies showed that its relatively young employees would be taxed by staying in the semi-mature PAYG-financed federal system, in comparison to the return they could obtain investing in the capital market. Contributions are invested in a central fund whose management was contracted out to a private firm. Although Alaska appears to have succeeded in shielding the fund from politician-directed investments, it has suffered problems with the private provider. Alaska's first mistake was to contract out the full fund to just one private manager, on a long-term basis. In addition, Alaska left the full responsibility of monitoring this private provider to a single official who was not a financial expert. The management company chosen turned out to be close to Michael Milken and invested 70% of the portfolio in junk bonds of low quality. The fund management company is currently undergoing bankruptcy procedures and would pay 70 cents on the dollar. In 1992 the state of Alaska voted a budgetary support of 140 million dollars to the central fund, providing an ex-post guarantee against fraud and regulatory failure[22].

Specific Regulations that limit fraud are:

(i) Detailed legal definition of the fiduciary duties of private providers, including supporting penalties and preventive supervision.

(ii) Regulation of the internal organization of the investment management firms that wish to sell services to private foundations, that aim at prevention of some obvious conflicts of interest. Examples include mandatory separation between the fund management function and management of their own funds, a mandatory number of independent directors[23], and mandatory reviews of internal procedures by outside auditors.

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22 I am indebted to Professor Dan McGill from Wharton for this description of the Alaskan experience.

23 Independent directors were introduced in the United States legislation in 1940. They are directors not linked to the controlling shareholders of the fund management firm and its affiliates, although they are chosen by the owners of the fund managment firm. This institution was proposed by the Chilean government in the January 1993 pension reform package.

(iii) Regulations that prevent providers from directing pension investments and reinsurance to affiliated parties.

(iv) In the case of fund managers, regulation of the procedures for buying and selling securities, such as those requiring transactions to occur in markets that are liquid enough to prevent price manipulation and those prohibiting trading patterns that may allow affiliated parties to exploit pension funds.

(v) In the case of private insurers, it is essential to regulate their solvency to increase the likelihood they will actually pay the promised benefits. This protects both the beneficiaries and the government, in case the latter provides a partial guarantee to annuities. Solvency regulation should stress exposure to interest rate risk and assure portfolio diversification. Authorization of variable annuities which transfer part of the investment risk and the lifetable risk to the annuitant is an attractive option because the solvency requirements on the insurer can be relaxed substantially.

It is often argued that these regulations are too complex for developing countries to implement, so privatization will lead to exploitation by providers. The Chilean experience proves the opposite. It is interesting to recall the early assessment of observers of the Chilean reform. For example, Arellano (1981) wrote that "....most Chilean banks are part of large business groups... A similar situation occurs in insurance markets... these same groups have organized the private providers of pension services to tap the funds of social security, so their power has increased... the shareholders of the nine largest private providers of pension services are these business groups, who also control 46% of capital and reserves of banking systems...the risks of an increase in commissions by an oligopoly of providers has risen substantially".

The Chilean experience shows that these concerns were taken very seriously by the political establishment, and it reacted imposing strong regulation. There is abundant evidence that shows that tightening of regulatory standards in the Chilean financial market started three years before the 1983 insolvencies in the banking sector, with the introduction of prudential regulation in 1980, and with a law that imposed a schedule of reduction of bank loans to affiliated parties in August 1981. This law was bitterly opposed by the local business groups (de la Cuadra and Valdés-Prieto, 1993). The sequence of events in Chile suggest that political pressures towards limiting the financial power of business groups were triggered precisely by the approval of the privatization of mandatory pensions. For example, the February 1981 law that prevented banks from becoming providers to the new pension system originated in doubts about the financial stability and efficiency of existing banking supervision mechanisms (Büchi, 1993). Another example is that the new pension funds were not authorized to buy equities, as the securities regulators had denounced share price manipulations in 1980.

The conclusion is that these regulations can be expected to be implemented in most middle-income developing countries, because even populist politicians have clear incentives to promote them. In these countries the real danger is overregulation of the pension fund management industry and excessive costs, driven by populist politics. However, this conclusion fails for countries where a politician cannot build a reputation by attacking abuses by large business groups, as it may happen in centrally planned economies or where politics is dominated by the business groups themselves.

Regulations to Avoid Concentration of Power

An important objection to the creation of a government board of trustees that manages a national pension fund is that it would have excessive power over private industry, as it would hold large blocks of private securities such as corporate bonds, bank bonds and equities. This objection is also raised in respect to privatized fund management, when the fund management industry is concentrated.

If the private foundation approach to demand is followed, it is very unlikely that the fund management industry will become concentrated, as shown by the US and UK experience. But if that industry becomes concentrated, the Chilean experience shows how concentration of power can be limited, even if the fund management industry is concentrated. In 1985, a law limited total equity holdings in any one firm by the set of pension funds managed by affiliated fund-management firms to 7% of the outstanding common stock. This limited voting power in shareholder meetings. A law proposed in January 1993 would limit fund management companies to vote for candidates to the board of directors that are independent from both the fund management company and the controlling shareholders.

Regulation of joint facilities

It is likely that private providers of some services may wish to organize some production activities on a jointly-owned basis to reap economies of scale. An example is a clearinghouse that reduces the cost of collection by computerization and centralization of all payments by a given employer with a single collecting agency. Another is coordination of effort to collect on delinquent employers that delay payment of contributions[24].

Such joint facilities should be regulated to prevent their use as barriers to entry into the provision industry, or as a means to implement side-payments in collusive agreements among private providers.

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[24] Joint facilities should not be prohibited by statute, as is currently the case in Chile. In that country, the law prevents fund management companies from engaging in activities not specifically prescribed by law, and there is no provision allowing investment in service companies such as clearinghouses.

3.4 Privatization and Income Redistribution

As in other industries, privatization of provision forces the government to make explicit choices regarding distribution, which are typically hidden when provision is nationalized. This problem takes two forms in the pension case:

a) Average pricing and rent dissipation.

The actuarial price of insurance is different for different people. For example, the rich should get a lower annuity *ceteris paribus*, because their life expectancy is higher. Nationalized pension systems typically opt for average pricing, i.e. flat actuarial factors, acknowledging very few or no ex-ante differences between classes of purchasers of insurance which are objectively different. For this reason, nationalized pension systems tend to redistribute wealth in substantial amounts.

Privatization forces legislatures to be explicit about these redistributions. The government may attempt to tax implicitly those considered as excessively wealthy by mandating the use of a flat actuarial factor. This policy instrument is not compatible with efficient privatization because firms will direct their marketing effort to attract those taxed rather than those subsidized, unless the difference in risks is small enough. This expenditure will dissipate part of the rents obtained by serving the taxed groups, by increasing total costs.

Flat actuarial factors should be substituted by an explicit tax and transfer system, so redistribution can proceed as desired. However, as the political system is forced to make explicit decisions regarding distribution, it becomes impossible to engage in capricious redistribution or to favor pressure groups covertly through mandated flat insurance.

b) Redistribution through administrative charges.

Several pension services have costs that are independent of the income or wealth of the contributor, so cost-based commissions are more burdensome for low-income contributors.

In mandatory pension systems where provision is nationalized, administrative costs are deducted from benefits in a proportional manner. This is a hidden tax-transfer system that helps low-income contributors. Privatization of pension provision must introduce some explicit redistribution mechanism if this distributional objective is to be preserved. The failure to do this can lead to substantial distortions. The Chilean case is an example of this problem (see Arrau, Valdés-Prieto and Schmidt-Hebbel, 1993).

A second issue is the possibility of price discrimination. An attempt to deal with this possibility by forcing providers to charge uniform commissions by

statute may easily backfire, as the Chilean experience suggests. In that country, mandatory uniformity of commissions has eliminated the incentives to employers and unions to sponsor group selection of provider, because they cannot obtain savings for their members even though group purchase increases the price elasticity of demand and reduces marketing costs.

The presence of private foundations that negotiate charges with private providers generates high price elasticities, which in turn reduces radically the scope of price discrimination by providers. However, the foundation is left with the task of allocating administrative charges among workers - and firms-, and it certainly has the power to discriminate between different classes of workers of member firms.

This raises the danger that political dissatisfaction with the resulting pattern of distribution may lead to costly auditing procedures and detailed regulations on foundations, as has happened in the United States regarding private pensions. The alternative of allocating total costs according to the marginal costs associated to each worker may also require the collection of very large amounts of information. It may be preferable that the statutes impose a set of simple rules of thumb that avoids costly procedures and regulations, such as sharing invalidity and survivorship insurance costs according to the life tables and covered wage levels, and sharing the remaining costs according to the outstanding balance in the individual account.

3.5 Externalities of Capital Market Development

Privatization of provision requires a substantial investment in institutional development. The regulatory requirements mentioned above impose a large investment in new institutions, like fiduciary rules, limits to transactions with affiliated parties, independent directors, identification of conflicts of interest common in the capital market, insurance contract design and others.

This investment is at the same time a barrier to and an advantage of privatization. It is a barrier because many countries will find it unrealistic to commit to such developments. It is an advantage because these institutions can also be used in the rest of the capital market at little extra cost. This means that privatization is a commitment to a long-term program of capital market development. Of course, in theory that same program can be implemented without privatizing pension provision. However, privatization creates a pressure group that promotes capital market development in some areas - fund managers and insurance companies want wider investment portfolios- while it furthers the careers of politicians that press for some aspects of capital market development such as regulation of conflicts of interest.

4. The Third Design Dimension: Funding

Earnings-related mandatory pension systems exhibit an additional design dimension, the degree of funding, which is basically independent from insurance design and privatization.

4.1 Privatization does not require Funding

The independent nature of the funding dimension is not widely understood, as suggested by the abundance of statements that postulate funding as a prerequisite for privatization. Just as a transition to a funded pension system does not assure an increase in national saving, privatization does not require a change in the primary fiscal balance nor an increase in national saving. Privatization does not require "true" funding; only "apparent" funding is needed.

To see this, consider a country with a substantial primary fiscal deficit, and a mature PAYG-financed pension system, either balanced or unbalanced. A shift to competitive private provision on an apparently funded basis can be achieved through the following steps, without changing the primary fiscal position: (a) divide the initial contribution rate into a pure wage tax at a rate to be determined (this makes explicit the hidden tax associated to a mature PAYG-financed pensions[25]) and a (smaller) forced contribution; (b) each owner of pension entitlements - both retired and active - is given tradable treasury bonds to redeem the stock of his/her pension entitlements. The individual entitlements would be calculated on the basis of the old pension benefit formula. The present value price of those bonds does not have to be determined. The new debt would simply replicate the promised structure of payments under the nationalized pension system, given that contribution stops now. For example, it would promise a flow of payments that starts at the estimated pensioning age and lasts for the estimated expected life given pensioning[26]; (c) workers are forced to entrust the management of their

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[25]The pure wage-tax component of mandatory contributions is the present value difference between the benefits earned if the contributions were invested at the market rate of return and the benefits obtained in the pension system, which yields a lower return (Auerbach and Kotlikoff, 1987). Equivalently, the pure wage-tax component is the cost to the contributor of being forced to purchase public debt that yields a return smaller than the market return. The revenue from this pure wage-tax is needed to service the outstanding entitlement-pension debt.

[26] This example follows the Argentine pension reform proposal of 1992, in which the contributions paid in the past will continue earning the low demographic interest rate. The Chilean design of 1981 calculated the size of payments on the basis of initial pension benefits, plus 4% real interest rate up to the payment date, which is closer to the market rate. This bonus benefited the transition generations at the expense of the future generations, because

treasury bonds and future contributions to one of several licensed fund management companies or insurance companies, chosen in a way that depends of the design of the pension system; (d) the fiscal cost of meeting the promised payments in the newly issued debt is met through the issue of new debt in amount sufficient to keep constant the debt/wage bill ratio. The remaining cost is the interest service (this time at market rates) minus the growth rate of the wage bill, and it is financed with the proceeds from the new wage tax discussed in (a). Therefore, this new debt is rolled over perpetually, so there is no fiscal effort nor "true" funding.

Once a market for these new issues of public debt establishes a price for them, this price is used to value the stock of debt managed by private providers, and the rate of return is used to determine the new wage tax discussed in (a). Its revenue must assure the absence of fiscal impact. Note that new cohorts obtain the same pension as if the old system had continued, regardless of the market determined rate of return that obtains. Even though they contribute less (the wage tax is not contributed any more) their rate of return is higher, and the same pension obtains.

Now that apparent funding has been achieved, private fund managers can be allowed to realign their investment portfolios over time, according to a schedule. The result is that part of the newly public debt ends up being held by other investors, while pension funds diversify towards private and foreign assets.

Note that pension fund managers will exchange treasury bonds for other assets only if they think they can obtain a higher or safer return, so there should be no massive sell-off. This is because the primary market for new public debt establishes a price that takes risk into account. If market rates on treasury debt rise as private providers realign investment portfolios, one may inquire about the cause for imperfect substitution between government debt and other assets. This increase may be merely making explicit the financial risks suffered by workers that held pension-entitlement debt. This may be part of the hidden tax associated to mature PAYG-financed pensions in a country where the local government is in a weak financial position. Alternatively, the increase may be due to an improvement in investment opportunities in other securities issued by the domestic private sector or by foreigners.

The market-determined initial yield of the new treasury securities is found first, and then the size of the wage tax is adjusted to assure fiscal balance. Further variations in the market-determined interest rates on long term treasury debt would be confronted as in standard practice, adjusting taxes and expenditures.

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they obtained a higher return than expected on their pre-reform contributions.

This arrangement is fiscally equivalent to the initial situation in intergenerational tax incidence. It is also equivalent in terms of current tax incidence, because the mixture of true payroll tax, VAT, income tax and other taxes does not change[27]. Abandonment of nationalized provision in favor of the competitive private alternative need not affect the primary fiscal balance, the true total public debt nor requires the creation of new taxes. Privatization only requires re labeling of stocks and flows so that fund managers can realign portfolios, and this can be done without affecting savings the budget or the stock of national wealth.

4.2 Problems and Opportunities of Funding

a) Inflation Risk and Funding

As discussed at length in section 2.1, one of the main problems with apparent funding is that few capital markets include a well developed market for long-term indexed corporate debt. This forces pension fund managers to invest more in equities, but this is costly in terms of risk. If the only issuer of long term indexed debt is the government, and its risk-return profile dominates the one that can be achieved by investing in corporate equity and nominal debt, then there is no need for fund management services, and a PAYG financing system offers the best portfolio.

This all-or-nothing conclusion is not convincing unless a market for long-term indexed corporate debt develops. However, this requires a substantial effort of capital market development. The main policy in this point is to redesign banking regulations so that banks can issue short-term (90-180 day) indexed deposits to finance indexed loans for working capital (365 days) to firms. Indexed loans for working capital may be attractive to firms because they can avoid the inflation risk premium charged by depositors-lenders when the contract is defined in nominal terms. Such reforms must include adjustments to the tax code to limit taxation only to the real interest earned, adjustments to the accounting standards, and adjustments to commercial law. Once indexed bank deposits are available, it is straightforward to extend this approach to the markets in commercial paper, corporate bonds, mortgage bond and long-term bank bonds[28].

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[27] This is a result I discovered on the basis of comments by Larry Kotlikoff.

[28] Indexed pensions are feasible in funded pension systems invested in private sector securities, as the Chilean experience shows. In 1992, about 20% of pension investments were in equities, 40% in indexed private sector debt and 40% in indexed government debt.

As in an unfunded p nsion system, indexation of pension benefits in a funded system invested in outside assets is subject to the risk of index adulteration by the political system. This is the risk that a law in the future redefines the index, de-linking it from the evolution of the CPI. That happened in Brazil in 1985 during the Plan Cruzado, and was repeated in some of the next stabilization attempts. The result was that the private voluntary market in indexed securities disappeared.

b) Liquidity Risks for Individual Pension Funds.

It is sometimes argued that funded pensions are subject to the risk that active contributors may desert a given pension fund while all beneficiaries stay, leading to a liquidity crisis.

There are two causes for concern. One is that the fund is forced to liquidate its portfolio because a substantial number of workers leave. It is obvious that pension fund managers have an interest in arranging the obvious solution: the selling fund transfers a basket of securities from its portfolio - valued at current market prices - to the funds where its workers are going. This avoids liquidation of individual holdings and stock exchange charges.

The other concern is related to the contributor/beneficiary composition. This is not an appropriate cause for concern. If only beneficiaries remain in an insurance company fund, assets have to be liquidated only if no new beneficiaries enter the fund, i.e. only if the average age increases over time. However, this liquidation is quite slow, so no liquidity crises is to be expected.

c) Excessive savings in the case of true funding.

If a funded pension system is built through new savings - by either starting such a system anew or by shifting from a PAYG system with a tax-financed transition - an important concern is what will be the effect on real rates of return in the long run. It should be noted that all this saving is being channeled through the capital markets, which are not very deep in developing countries. Even in developed countries the effect on real rates of return could be substantial, as the long term volume of pension funds is expected to stabilize near 1.5 times GDP.

Assuming a closed economy, it is conceivable that mandatory savings reduce the real rates of return below the growth rate of the economy - defined as population growth plus technical change - in which case we get dynamic inefficiency. In recent simulations by Valdés-Prieto and Cifuentes (1993) with a general equilibrium model this is shown to be possible, albeit at very high contribution rates, over 20%.

The optimal policy response to this event is clear: reduce the contribution rate. This will reduce pension by little, since that reduction will bring higher

rates of return. An alternative response is for the government to issue more public debt, so that the degree of true funding is reduced and real rates of return can rise above the long term growth rate.

A different problem arises when there is no dynamic inefficiency but the domestic capital market is unable to absorb these savings at adequate rates of return. In this case a large private incentive to securitize real assets appears, because this allows arbitrageurs to pocket a capital gain proportional to the difference in rates of return between physical and financial assets. In other words, the supply of financial assets must be very elastic at low rates of return.

d) Funding and privatization of public enterprises

Transition economies are searching for methods to privatize their public enterprises. A tantalizing alternative is to pay off the pension entitlements owed to workers and pensioners with shares in these enterprises. This involves apparent funding - no new saving - so it is easiest to analyze it in two steps: first, privatization of pension provision as in section 4.1, and second privatization of public enterprises. In the second step, the government sells tradable shares in public enterprises and accepts public debt as payment - retiring public debt. As the government reduces simultaneously its assets and liabilities, the primary fiscal balance is not affected.

The advantage of this two-step procedure is that privatization of public enterprises can proceed at its own pace. The problems of corporate governance that are central in economies in transition can be attacked over time. Part of the solution to those problems may include a phased sale of some equity blocks to pension funds, but they should not be expected to solve all corporate governance problems. The first priority of pension reform should be to pay the highest and safest possible pensions, not to privatize assets.

4.3 The Politics of Funding

a) Introducing a PAYG financing method commits future governments to issue debt for 40-70 years.

Introducing a pension system financed with a PAYG method is not equivalent to a simple fiscal deficit financed with the issue of public debt this year, which could be discontinued next year because it does not bind the next government. Rather, it is equivalent to a commitment to issue public debt, that is to increase the sum of outstanding pension entitlements already earned by contributors, for the next 40-70 years, which is the duration of the introductory period.

The issue of pension-entitlement debt can, in theory, be backed by investments in outside assets such as domestic private securities, foreign

assets and physical capital, in which case the net debt remains at zero in every period. Experience, however, shows this is unlikely. First, in any political system the presence of a cash surplus sets in motion incentives to spend it, which may or may not be resisted. Second, as the introduction surplus is long-term, in the sense that is expected to persist for 40-70 years, it is natural that the political system chooses to use large parts of it to finance new programs that require permanent expenditure, such as health care or financing of a permanent primary budget deficit. Such programs cannot be reversed by a future government as easily as a transitory deficit. Third, the alternative of saving the surplus into a government-managed trust fund is controversial, due to fears that such a trust fund will lead to government domination of private industry through its investments in shares and corporate bonds[29]. Fourth, even if a fund is maintained, it may be willing to buy a substantial amount of government debt. This allows the government to reduce taxes or increase expenditure and run up its explicit debt for 40-70 years. This last point suggests that the introduction of a privately-managed mandatory pension system can produce fiscal deficits for 40-70 years.

The result is that when a government introduces mandatory earnings-related pensions it has to accept that there is a significant likelihood that the introductory surplus will be spent, at least in part. This is equivalent to a commitment to spend more and save less for the next 40-70 years.

b) Inter-generational redistribution as a rationale for PAYG financing.

At some points in time some countries have decided that their currently old generation deserves an income transfer. This has been the case of war veterans, victims of economic depressions, and maybe some older workers displaced in transition economies because of the end of the communist economic system.

To achieve this purpose, the targeted old generation can be granted extraordinary pensions, financed by taxes to the current young and yet unborn generations by financing these expenditures with new public debt.

Introducing a pension system financed through the PAYG method to help such old generations is not equivalent to this policy. The number of cohorts that receive a transfer (net subsidy) when PAYG-financed pensions are introduced is between 40 and 70. This means that a limited transfer to a few unfortunate cohorts is used as an excuse to engineer a much larger transfer to all generations alive during the introduction and usually to quite a few more.

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29 This was the main argument behind the 1939 reform to the US Social Security System that changed its basis from funded to unfunded (see Achenbaum, 1986).

To see this, consider the case of a worker aged 45 at the date of introduction. In the case where contributions and benefits are set at the start to allow cash-flow balance in the long run, this worker will receive a full pension even if he will contribute for only 20 years. This implies a net subsidy even after subtracting the hidden tax associated to steady-state PAYG financing. In practice, contribution rates are slowly increased over time, so even a worker that entered the work force 10 years after introduction may obtain a net subsidy. Another important mechanism that may raise the number of subsidized generations substantially is the gradual extension of coverage as the formal sector increases its relative importance with the process of economic development[30].

Such a massive transfer to all the currently living generations would rarely survive explicit policy discussions. When the currently working generations just want help out some of the current old generations, the use of a policy that transfers resources to themselves is a clear mistake at the expense of yet-unborn generations.

Another argument that justifies introducing a pension system financed through the PAYG method to achieve intergenerational redistribution argues as follows: currently alive generations are poorer than yet-unborn generations, so a transfer towards the all those currently alive is desirable from an egalitarian point of view[31]. However, it has been observed in many countries that transitory income increases are used to pay off national debt. This was the case in England during the last three hundred years (Barro, 1986), Indonesia after the second oil shock, and Colombia during the 1978-80 coffee boom. The fact that many countries have reduced their national debt when income rises transitorily suggests that the egalitarian transfer argument was deemed spurious at least in those cases.

In fact, inter-generational transfers frequently go in the reverse direction, i.e. from the living generations towards the future generations. The massive size of observed educational expenses suggests that inter-generational transfers towards the currently living are deemed undesirable. This undermines the egalitarian transfer argument to justify the issue of implicit debt by introducing a PAYG-financed pension system.

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30 If extension of coverage proceeds from higher income to lower income workers, this intergenerational redistribution is regressive.

31 A identical inter-generational redistribution is obtained when the government inaugurates a 70 -year program of issue of public debt, to be serviced by future increases in wage taxes, and spends the proceeds to benefit current generations. A desire for massive inter-generational redistribution does not have to be satisfied by the pension system.

c) The empirical tendency of mandatory pension systems towards PAYG financing.

In the British case, William Beveridge recommended that a fund be formed with the contributions of the first 25 years. In fact, the funds were rapidly spent to help the veterans of World War II and the Great Depression (Falkingham and Johnson, 1992). It is not surprising that the veterans received help. What matters to us is that the government refused to raise general taxes to finance this new expenditure and instead turned to the cash flow generated by the pension system. This tendency can also be observed operating in the U.S. federal social security now. The social security program has been accumulating a trust fund since 1983 to confront the demographic effects of the baby-boom generation. However, the inclusion of social security, which is in surplus, into the Gramm-Rudman budget definition has allowed the primary federal deficit to be much larger than what it appears to be (Leonard, 1990).

In the Southern Cone of Latin America - Argentina, Chile and Uruguay - mandatory social insurance programs were introduced in the 1920's. In these countries a part of the introductory surplus was invested in government debt at low nominal interest rates and the rest was destined to finance the cost of additional branches of social security, like health service that was delivered free to affiliates. In one Chilean Social Security Institute, over 40% of contributions were paid back as family allowances (Wagner, 1983). The new benefits were available only to the institutions' contributors, i.e. not to all citizens. This lead to a maze of privileges and inequities. For example, in Chile only white collar private sector workers obtained the huge family allowance, while blue collar workers that were substantially less well-off did not get one. These inequities fueled popular support for politicians that promised to equalize benefits across institutions, by raising them to equal the most generous. The whittling down of reserves led the Southern Cone countries to legally acknowledge a de-facto shift to a PAYG financing system in the 1950's.

An almost universal tendency from full to partial funding, propelled by the same political economy factors, has been observed in most other countries of Latin America with state pension systems (Mesa-Lago, 1978, 1990). This process was accelerated in the 1980's by the debt crisis, because many governments raided the social security funds by paying negative real rates of return in their borrowings from them (Mesa-Lago, 1991).

The tendency of mandatory funded systems to spend the funds has also been observed in Africa also. Vittas (1992) reports real rates of return below -10% per year in the countries with provident funds. A dramatic case of mismanagement is the Philippines, where President Ferdinand Marcos

raided the provident funds for personal purposes (Far Eastern Economic Review, 11/29/90).

Coming back to the OECD, the Canadian case is reviewed by A. Munnell and N. Ebensberger in Weaver (1990). Canada instituted an earnings-related pension scheme in 1963, that began paying pensions in 1976. This allowed the accumulation of contributions for 13 years, creating two pension funds whose volume added to 8% of GDP. The largest of these two funds was invested mostly in provincial government debt. This fund obtained a return smaller than the market interest rate for the same risk, and some provincial governments increased spending and reduced taxes in response to the availability of these funds.

Another factor behind low returns for pension funds in 1930-1979 was the repression of financial markets, including exchange controls, ceilings on nominal interest rates and punitive taxes on dividend payouts. This induced many trustees to invest in real estate, but in many cases populist rent-control laws led to a squalid income and substantial depreciation of capital values.

d) Balanced PAYG financing is not the limit.

Another important empirical fact is that the dynamics of the political system may lead further than the issue of a large hidden debt, into a cash deficit at the pension system that induces a fiscal crisis.

The three mechanisms that may generate this result are: (a) the new permanent spending programs to be financed with the introductory surplus is bound to generate a fiscal crunch 40-70 years after introduction. This crunch forces the political system to either raise general taxes or reduce spending, but there is a chance of gridlock, which would lead to a fiscal crisis; (b) exogenous events such as the demographic transition and the slowdown of productivity growth may push the pension system into a deficit which the overall fiscal position cannot absorb without going through a crisis first; and (c) problems in the overall fiscal position may lead to attempts to draw revenue from the pension system, at a scale that this system cannot absorb without going through a crisis.

The common thread in these processes is that budget crunches are not easy to manage for the political system. This is true in the simple case where the end of the surplus occurs slowly over time, but it is even more likely when an unexpected shock occurs. In the case of predictable trends like the demographic transition and the increase in longevity substantial foresight is required from the political system to avert a fiscal crisis. These predictable developments tend to bankrupt a balanced and unfunded PAYG system that is balanced at the initial demographics. The political system should act decades ahead by raising contributions or reducing benefits - both deeply

unpopular- to maintain the insurance value of pensions. Experience shows this is unlikely (OECD, 1988).

Similar requirements on long-term political responsibility are introduced by other trends in the labor markets that take ten or more years to revert, like increases in net emigration by the young (the case of Uruguay), reductions in the rate of increase in labor force participation, increases in the unemployment rate, increases in the share of employed workers that work independently or in the informal sector (Argentina in the 1980's), increases in the willingness to under report taxable wage income, reductions in the rate of growth of average real wages and reductions in the average hours worked.

Another process emphasizes uncontrolled growth in benefits rather than a reduction in collections. If the transition to PAYG and the associated expenditure of the surplus originated in the contributions of the first 40-70 years is not managed with uniform contributions and benefits across sectors, inequities may allow politicians that offer upward-equalization in pension benefits to achieve electoral success, even if the long-term finances of the pension system become jeopardized.

A funded pension system, that invests in outside assets - different from the local government's debt and state enterprise debt - offers more defenses for the owners of pension entitlements. Of course, if outside assets exist, the government may attempt to tax or take the funds in various ways. However, if political incentive mechanisms as those discussed below are in place, politicians will be forced to stop this process. Meanwhile the pension fund can be slowly drawn down and pension benefits will continue to be paid.

Specially-designed political incentive mechanisms can also be used in PAYG-financed systems. Nevertheless, their effectiveness is much higher when the pension system is funded, because the existence of a fund provides time for the political incentive mechanisms to operate.

e) A few countries have succeeded in maintaining mandatory pensions funded.

A few countries have met qualified success in backing their pension-entitlement debt at least partially with investments in non-government securities. These experiences allow us to extract lessons about mechanisms that limit the political-economy dynamics described previously.

In Canada, the smaller Quebec fund was invested in corporate debt and equity. It obtained market returns while its presence did not induce the province of Quebec to increase its primary deficit. This suggests that some institutional designs are more effective to deal with political pressures and can allow a fund to survive (Munnell and Ernsberger, 1990).

The Swedish case, also reviewed by Munnell and Ernsberger (1990), is also a qualified success. Sweden established an earnings-related pension scheme called ATP in 1959, and waited 20 years to make its first pension payment. It accumulated funds for 30% of GDP. It pays defined-benefit pensions, equal to 60% of the average earnings of the best 15 years. A large part of the AP funds, which almost reached 75% at some point, were invested in Swedish government securities, but a substantial fraction was lent to domestic banks and corporations. One interesting feature is that the board of trustees is separate from the rest of the government, although its members are designated by Parliament. Regarding investment returns, they were substandard by 3-4% (anual) compared with what could have been obtained with a domestic portfolio (Pontusson, 1984), which cumulates to at least 45% in value after 20 years. It was probably even worse than what could had been achieved with an international portfolio, as the AP funds had to comply with the financial repression and exchange controls imposed by the Swedish Central Bank up to 1986.

Singapore and Malaysia have been able to build national provident funds for 40 years. The Singapore Central Provident Fund invests 100% in government securities, but its financially conservative government appears to have invested this sum and even more in foreign assets. The Malaysian Employees Provident Fund (EPF) is forced by law to invest at least 70% in government securities, and during most of its existence it has invested close to 90% in them. The Minister of Finance appoints directly four of the seven members of the investment board, and a statute guarantees a floor of 2.5% annual interest rate to affiliates (nominal). Up to 1986, the EPF yielded 3-4% (annual) below the average interest earned by bank loans, but this difference dissappeared in 1987-89. On the other hand, the nature of political competition in both countries is rather peculiar, so it is not clear how representative is their example.

Another case is Chile, where a reform to the mandatory pension system occurred in 1981 and introduced a mandatory defined-contribution system based on individual accounts. The Chilean funds have produced rates of return very close to those available in the local market for the same level of risk (Walker, 1993). Special features of the Chilean funds is that they are prohibited from investing more than 45% in government securities and that they are managed by fund management companies chosen directly by affiliates. A notable event occurred in 1991 in Chile, when several fund management companies sued the State Development Bank for not meeting in full a guarantee it had issued in favor of bonds issued by an ailing coal company. This degree of conflict with the political establishment has not been observed in other pension systems.

4.4 Constitutional design to sustain funding.

The political economy problem in compulsory pension systems is that they are prone to operate as off-budget pork-barrels, at the cost of national saving. One policy response is to take measures at the constitutional level that sustain responsible policy-making and a long-term outlook. This section outlines policy measures available at the level of constitutional design. We draw heavily on the modest set of success stories mentioned above.

Reform of the law-making process

An important institutional reform is to raise pension matters to a constitutional status similar to that granted to the budgetary process. This can be achieved by restricting the right to initiate law in pension matters to the executive branch of government[32]. This helps by preventing individual elected representatives from proposing increases in pension benefits without having assured first the existence of financing that is compatible with overall fiscal policy.

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In most developing countries, the government does not project periodically its pension liabilities for the next two generations, say 80 years or more. This reduces awareness of the financial implications of current pension benefits and taxes among politicians, leading to mismanagement of this critical element of fiscal policy. The result is increased variability of benefits and contributions, and an excessive vulnerability to the pressure of interest groups.

An improvement can be achieved by creating a quasi-independent body with the responsibility of making actuarial projections of mandated pensions and of supervising the overall performance of the pension system. Independence can be achieved through a board with members with overlapping tenures, as is common in independent Central Banks. Such a body may be entrusted with the power to adjust some basic parameters, such as the contribution rate.

Reform of political incentives by assuring the electorate identifies the issues:

This approach facilitates identification of the losers from a policy of underfunding among the electorate. This can be achieved by creating a direct link between the financial performance of pension funds and the economic interest of significant public opinion. Specific policies are:

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32 This reform was adopted in Chile in the 1980 constitution.

i) Change the pension definition to the defined contribution type, so that benefits depend of the performance of the funds. This creates a large pressure group, which is the set of all contributors, in favor of maximum performance (return and security) and against premature spending of their contributions for other purposes. A shift towards defined contribution programs should exclude persons close to retirement and old pensioners, because they are in no position to absorb too much investment risk. This tradeoff can be avoided by insuring pensioners and older workers against investment risk, but not younger workers.

ii) 100% of the contribution should be collected in the name of the contributors. This is almost the opposite of the common practice of dividing contributions between the employer and the employee[33]. The gain from collecting all the contributions in the name of the worker is to strengthen his/her perception that all the funds are his/her private property. This may improve public opinion's perception of the legal right contributors have to maximum investment performance and of the risk that future governments may default on the benefits promised today.

iii) Introduce individual accounts with periodic reports. This policy measure supports the message that the funds are the private property of contributors and that they have the right to require maximum performance. This measure does need not be expensive, since mandatory pension system have to keep individual records anyway for the calculation of the average income on which invalidity and survivors benefits are based.

Avoid regulations that impose a minimum holding of government's securities

The international experience reviewed above shows pension entitlements are subject to sovereign risk just as any other type of government debt. Voluntary creditors to sovereigns recognized long ago that one of their best defenses lies in fungibility of old and new debt. This requires unencumbered tradability of titles, which are just the opposite of the specially issued, non-transferable titles that state pension funds receive in many parts of the world.

Experience in Quebec and Chile supports the notion that pension funds become able to preserve value when they are allowed to invest a substantial amount in private sector securities. This gives them the ability to reduce their exposure to sovereign risk, and at the same time disciplines the sovereign into safe financial behavior, because these funds are not longer assured. That is why an important constitutional reform is to prevent the

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33 Of course, this practice does not affect the economic incidence of the contribution, whatever it might be.

legislature from passing laws that force the pension funds to purchase minimum quotas of government securities.

Allow international investment of part of the pension funds.

A similar case for allowing international investments can be made. Forcing pension funds to invest domestically when the country is small may seriously impair the risk-return possibilities that can be offered to contributors. More important in this section, such investment restrictions clearly reduce the pressure on the local government to increase the quality of its securities by following sound financial policies.

Privatize demand to improve political incentives

One problem of making a mass of citizens oppose reductions in returns and increases in risk that reduce the quality of their pensions is that few have a concentrated interest in defending fund performance. We must keep in mind that proponents of public spending programs do have a concentrated interest in using the introductory pension surplus or taxes on outstanding pension assets to finance their programs.

The creation of political intermediaries that receive a mandate from masses of contributors to prevent underfunding of benefits and under-performance would solve this problem. One way to achieve this is to privatize the ownership of pension assets.

For example, consider the case where pension assets are held by insurance companies that absorb investment risks. When insurance companies accept premiums in exchange for pension promises, the funds become their private property. In this case constitutional protection of property rights and the clout of the insurance industry as a pressure group assure the existence of effective political opposition to attempts to reduce returns.

In a defined contribution setting we must consider the role of privately controlled trustee foundations that choose the identity of the providers of fund management services. From a legal point of view, trustees are fiduciaries with a mandate to defend the interests of the contributors whose employers chose them. If a proposed statute would impose a tax on all pension returns or force a part of all pension funds to be invested in low-yielding government securities, trustee foundations would have a fiduciary responsibility to oppose it. The set of trustee foundations are an effective pressure group that represents contributor interests in the political process.

Even in the absence of trustee foundations, but with individual choice of provider, this arrangement may be quite effective if it is in the commercial interest of an individual fund manager to oppose in the political arena any attempt to reduce returns. This may happen is such opposition creates

goodwill for it, increasing demand for its services. The Chilean experience of 1991, is that several pension fund managers sued the state development bank CORFO when it tried to renegotiate a bond guarantee that came due. This degree of political assertiveness could only happen because fund manager selection is privatized in Chile.

A private fund manager cannot be "removed" from its fiduciary role without previously convincing trustee foundations or contributors that they should switch provider. On the other hand, a bad performance has the potential of being met with a flight of clients and dissolution. This disciplines the private provider. In addition, it is possible to maximize the rivalry between providers by allowing them to be profit-oriented commercial firms. This is why a complementary policy is to shun state-controlled fund managers and insurers, since their dependence from politicians through other channels limits their ability to press for contributors' interests.

Given the experience around the world with government-managed pension systems, the privatization of demand for pension services appears as attractive protection and the most effective tool to increase the expected value of pension promises.

5. Linkages between the design dimensions.

This section discusses the interaction between the three design dimensions. We argue that the independence of the three design dimensions is limited when adding political economy considerations.

5.1 Two coherent combinations

Although each of the three design dimensions is multidimensional, we will reduce them to a few choices in this subsection. In the insurance dimension, we feel that there are two essential choices: flat actuarial factor versus individual actuarial factor, and defined benefit versus defined contribution (in the financial guarantee sense). In the privatization dimension, the two essential choices are private or nationalized provision, and private or nationalized demand. In the funding dimension, two choices are true funding or not, and apparent funding or PAYG financing.

There are many possible combinations, but some of them can be discarded. For example, let us consider privatization of supply. Regarding fund management, privatization is compatible with apparent funding, but not with PAYG financing, because in the latter there are no funds to invest in the capital market. Privatization should not be combined with flat actuarial factors, because private suppliers will compete to access the rents that accrue to workers that are awarded implicit subsidies. This competition will dissipate

part of that rent into costs and apparent beneficiaries will not receive what the statute awarded them. Privatization also leads to expensive risk sharing when using purely the defined benefit risk allocation in its strictest sense. This is because a full inflation-proof guarantee of return for many decades sinto the future requires large risk premia, which reduce benefits very significantly. Only governments o state-owned agencies are cavalier enough to offer such guarantee at less than actuarial risk premia. In order to have acceptable private provision, some risk absorption by beneficiaries is needed. This can be achieved by both DC and DB plans, of which the best is the one that is more transparent regarding risk absorption. This argues for defined-contribution type plans which include some investment guarantees. Political economy factors suggest that true funding is not a realistic option for most countries, although the Chilean experience is that it can be done (Diamond and Valdés-Prieto, 1993). In most political settings, at most partial funding can be hoped for.

The final option regards privatization versus nationalization of demand of pension services. This is the option between allocating workers to the private providers that the authority selects through bids, and letting the close representatives of workers choose provider of services. Although nationalized demand is feasible, as can be seen in pension plans for state employees in the United States, the analysis in section 4 suggests that privatization of demand (through foundations elected by employers) produces better political incentives to maximize the size and security of pension benefits for individual workers, for any given contribution rate. It is clear that nationalized demand of pension services would not work well in countries where the political process is underdevelopeed, in the sense that there are few effective checks and balances or where politics are seen by many participants as a means towards personal enrichment.

This implies that privatized pension systems should be based on an individual actuarial factor, some type of defined contribution risk allocation and apparent funding. Privatized demand is the natural implication of private provision. The difference between this coherent design and the current Chilean system is that private choice of provider should not be restricted to individuals, as employer selection is an attractive option.

On the other hand, if a flat actuarial factor is chosen, the associated redistribution imposes adaptation in other design dimensions. First, nationalized demand is the natural match to assure that the implicit redistribution is achieved at minimum cost, with no erosion because of choice by workers. The next step is to choose between private or nationalized production. Because of the significant sunk costs in specialized accounting services and in expert human capital, it is natural to prefer vertical integration, which implies nationalization. This is not true of the fund management function, if it exists. Although any funding mode is feasible,

political incentives suggest that PAYG financing will be chosen, either in the short or the long run, as shown by the evolution of pension systems in many countries. This does not negate that this outcome can be avoided for a long time, as shown by Sweden and Malaysia, where apparent funding is dominant. When production of pension services is nationalized, the defined benefit risk allocation may deceive policymakers by looking reasonably cheap, as insurance fees are not demanded by the state organization that produces pensions. However, a mode in which part of the risk is explicitly absorbed by workers must still be recommended to maintain fiscal stability. If the government is guaranteeing the real value of pensions. This may be very hard to achieve in a setting where production is nationalized and the political process prefers to show "success" by paying high pensions. The result is that the statute guarantees a fully defined benefit risk allocation, but in times of fiscal stress the statute is adjusted to reduce real pensions. In conclusion, a pension system built around a flat actuarial factor is the conventional pension system as observed in many OECD countries.

Summing up, the policy choice is between two coherent overall designs: an individual actuarial factor with privatized production and demand, explicit risk allocation to pensioners and partial funding, or a flat actuarial factor coupled with nationalized production, PAYG financing and statutory promises of fixed real pensions (defined benefit).

5.2 The degree of funding and risk management.

Balanced PAYG pension systems offer a risk-return pair that is poorer than what can be obtained in modern capital markets. To see this, consider if a sensible fund manager would invest 100% of a pension portfolio in an imaginary security whose return were tied to the rate of growth of the covered wage bill. This imaginary security would yield more than equities in recessions or in a year of stock-market panic, but the same is true of high grade corporate bonds, short-term bank deposits and government debt. For example, during the Great Depression in the United States, treasury bills offered a much higher return than the covered wage bill, which was beset by unemployment and the growth of the informal sector. An efficient portfolio would always include long term bonds, short-term deposits and equities to gain in the upside, as demonstrated by the portfolio policies of the company pension plans in the OECD.

In a small open economy, PAYG financing is clearly inferior to reliance on the world capial market. The inferiority of the risk-return pair offered by the hypothetical security whose return is tied to the rate of growth of the covered wage bill in the domestic economy is much more evident, because the opportunities for international diversification of risk are wasted.

Pension systems should optimize the risk-return profile they offer, without relying on state guarantees. In the case of PAYG-financed systems they are

unable to do so using standard portfolio choice. However, it can be suggested that they buy insurance for the event of a fall in coverage, a fall in real wages, etceteras in the private financial markets and from the government. However, state-managed PAYG-financed systems will have only limited access to private guarantees of this sort, because of moral hazard. A government may find it difficult to insure against a rise of unemployment or against an increase in under reporting, because it is the government itself who sets the rules for unemployment benefits and enforces the collection of contributions. As the government has significant control over the incidence of the risk insured, and events like lax enforcement of collection are not verifiable in a court, the problem of moral hazard is substantial in PAYG-financed systems.

5.3 Government Guarantees, Renegotiation and Equity.

In the end, PAYG-financed pension systems built around a flat actuarial factor make up for their inferior portfolio performance through a government guarantee. Myers (1992) argues that:

> "...critics of the current OASDI system in the United States do not recognize that a social insurance system is flexible and, if financial difficulties arise in the future, appropriate (and probably small) adjustments in contribution rates and/or benefit provisions can easily be made to rectify the situation".

In other words, future taxpaying generations must pay the cost of the guarantee in pension systems built around a flat actuarial factor. Instead of relying on the capital markets to value and produce these guarantees, a conventional PAYG system relies on future legislation to impose intergenerational transfers. The standard themes of intergenerational equity arise at this point, as do the well-known underrepresentaion of future generations in the current political process.

In a small open economy, which is subject to more variability, the cost of the fiscal guarantee needed to make PAYG financing viable is relatively much larger than in a large country. By the same token, such a fiscal guarantee is less valuable in a small country because it is less credible. This is because the risks that the local government will be unable to tax future generations as required is much higher. This is due to the higher volatily of the growth rate of the local wage bill, the higher risk of losing a foreign war and to higher emigration risks. Recall that we are considering risks over a 80-year horizon. The risk of emigration is still higher in small countries that specialize in the export of a few commodities. To the contrary, a funded pension system that invests around the world through private providers has a higher chance of providing benefits to workers if these risks materialize.

Still, it may be possible that in very large countries the government can produce these guarantees at a lower cost than the world capital market.

Credibility is also important. In mandatory pension systems where benefits are guaranteed by the state, benefits are subject to future renegotiation because the law that defines benefits is subject to future revisions. Pension benefits in such a setting can at most be endowed with property rights equivalent to those that apply to holders of sovereign debt issued by the domestic government. In fact, pension entitlements are usually endowed with even weaker property rights, because unlike sovereign debt, future renegotiation of pension benefits does not even breach into constitutional protections[34].

This is undesirable for two reasons. First, the possibility of renegotiation implies that current contributions are perceived as a tax to a larger extent while benefits become more like a subsidy, weakening the linkage between the two. This promotes evasion and raises the disincentive for work beyond the level implied by the mandatory nature of the pension system. Second, future renegotiation generates uncertainty among beneficiaries about the true value of their pension entitlements. For example, the experience of pension benefits eroded by inflation because government finances requires the revenue of the inflation tax is widespread among developing countries. In this sense, good insurance design requires credible promises.

Many of these renegotiations are the result of bureaucratic irresponsibility, political short-termism and benevolent inefficiency in the political process. It is unknown how many large countries really pass the test of credibility. In the United States, an Associated Press-NBC News poll taken in late 1982 showed that 75% of respondents had little or no confidence that OASDI would continue to exist (Myers, 1992).

In a mandatory earnings-related pension system built around private provision, the individual worker is required to forego some intergenerational insurance, and to pay explicit fees for the guarantees received. Many workers may prefer to do so in order to reduce risk at this more general level.

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34 Wagner (1983) argued that the drawback of unfunded pension systems is that individual property rights are not well defined. This is incorrect because the law that defines the benefit formula gives rights to individuals that will be supported by the courts, be they nominal or real pensions. This is the case in Argentina, where the failure of the government to pay the pensions defined in the law had originated 80,000 lawsuits against the state by early 1991, of which 20,000 have already been resolved against the state and the rest is expecting resolution (Message of Pension Reform Project, presented to the Argentinean Congress in June 1992).

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